THESIS

A STUDY OF ORGANISATION AND WORKING OF NTPC SINCE 1991

ABSTRACT

THESIS

SUBMITTED FOR THE AWARD OF THE DEGREE OF

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IN

COMMERCE

BY

DARAKHSHAN ANJUM

UNDER THE SUPERVISION OF

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READER

DEPARTMENT OF COMMERCE

ALIGARH MUSLIM UNIVERSITY

ALIGARH (INDIA)

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THESIS

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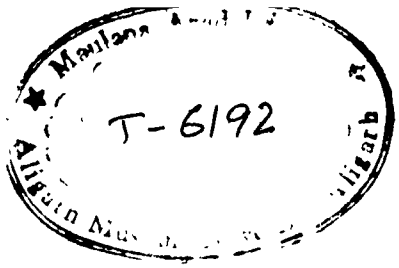

18 AUG 2006

ABSTRACT

Power is the most vital contributary factor to economic development and social transformation specially for developing countries of the world. Without the availability of power, the great strides taken by the society in industry, transport and agriculture would have been unimaginable. The generation of power in adequate measure; its proper transmission and distribution is, therefore, the prime endeavour of every nation.

In India the power development commenced at the end of the 19th century with the provision of electricity supply in Darjeeling during 1897 followed by commissioning of a hydro power station at Sivasamudram in Karnataka during 1902. The first steam power plant in the country was set up in 1899 at Calcutta to meet the power requirement of the metropolis. For the first time the water-power was utilized in India to run Cotton Mills at Gokak in 1886. A number of small power stations were setup by private industries, local bodies and government departments. The control of government over power supply initially started through the Indian Telegraph Act till the more comprehensive Indian Electricity Act was passed in 1910. The Act prescribed the methods, procedures and conditions for the grant of licences to private electricity undertakings.

It, however, was intended to mainly regulate and prescribe rules for licencee undertakings rather than to co-ordinate the power development in the country. A separate legislation towards this end was enacted in the form of the Electricity (supply) Act. Under this Act, State Electricity Boards were constituted and recognised as the principal agencies for undertaking the

overall responsibilities of generation, transmission and distribution of electricity within each State In consonance with the provision of the Act, the Central Electricity Authority was established in 1950 for formulating a national policy for power development and co-ordination among various agencies involved in the planning and implementation of power supply

Keeping in view the over-riding priority and importance of power, the Government of India also created a separate Ministry of Power The Ministry is concerned with policy formulation, perspective planning processing of projects for investment decisions, monitoring of projects, training and manpower development and the administration and enactment of legislation in regard to power generation, transmission and distribution The Central Electricity Authority constituted under the Electricity (Supply) Act, 1948 advises the Ministry on all technical, financial and economic matters relating to electric power

Now the Electricity Bill 2001 has been introduced in Parliament in August, 2001 The Bill seeks to replace the three existing Acts, viz., the Indian Electricity Act, 1910, the Electricity (Supply) Act, 1948 and the Electricity Regulatory Commissions Act, 1998 The Bill provides for a comprehensive yet flexible legislative, framework for power development The National Thermal Power Corporation (NTPC) came into being in November 1975 under the Central Public Sector with the prime objective of planning, promoting and organising the integrated development of power in the country by establishing super thermal power stations Since then, the NTPC is engaged in installation of coal and gas based power plants

alongwith the associated transmission system.

The NTPC is a torch bearer organisation in the power sector of the country which is committed to enhance the generation of power and its transmission towards attaining self sufficiency in power requirements of the nation and thereby contribute to the economic growth and development of the country. But in recent years India has been facing shortage of power and in some of its States the power-supply situation has become very acute and grim causing civil commotion and decline in industrial output. There have been dharnas, traffic jam and accusation of failure of power policy of the government. The situation is thus, indicative of an investigation into the role of NTPC and to trace out possible bottlenecks that have caused the present alarming situation in the power sector of the country.

In the present work entitled "A study of organisation and working of NTPC since 1991", an attempt has been made to look into the organisation of NTPC and evaluate its working since 1991 when India embarked upon introducing economic reforms, which threw challenges, particularly to Indian industry, to increase productivity as well as output in order to be able to face competition on home turf from the foreign players invading the Indian markets.

National Thermal Power Corporation works under the aegis of the Ministry of Power of Government of India. The Ministry of Power is kept informed and participates in the decision-making process within the company through its Joint Secretary who is nominated to the Board of the Company. Organizational Structure of NTPC functioning comprises of

three-tiers, viz., the Corporate Centre, which is an apex body, secondly, the regional headquarters, thirdly, the plant. The Corporate Centre retains only broad policy making, strategic and long term planning functions, assumes responsibility for research and development, performs core engineering activities, maintains liaison with international bodies, monitors NTPC's overall performance as well as development of NTPC's human resource and management systems.

The second tier consists of five regional set-ups, namely North, West, East, South and National Capital Region with their headquarters at Allahabad, Nagpur, Patna, Hyderabad and Delhi respectively. Each region is headed by an Executive Director who is accountable for the operations and project execution activities in the respective regions. At the regional headquarters offices, the Executive Director is the Kingpin and plays the middleman's role between the higher authority and the project's management. The regional offices are responsible for the construction, commissioning and operation of generating units. The project teams working at sites are headed by General Managers who report to their respective Executive Directors in the region. The Executive Directors, in turn, report directly to the Chief Executive at the Corporate Centre of their activities. Lastly, the projects of NTPC are the operational units directly responsible for generation of power.

The functions of Human Resource Department are all personnel matters and include Promotion, Project Employee Benefits, Human Resource Policy, Recruitment, Compensation, Employee Welfare, Pension, and Employees grievance redressal.

Of all the organisations dealing in the generation of power in the country, NTPC is a key player in the power sector. NTPC is making significant contribution for the growth of the economy by producing one-fourth of India's total power generation. The main working of NTPC include production of electricity, provision of consultancy services in engineering and construction of power stations, contracting and procurement services, operation and maintenance of thermal power stations, renovation and modernisation of power plants and financial and management consultancy, etc.

The Public Undertakings run on commercial lines and are directed as regards their working by the Board of Directors. But in the NTPC, the Minister is the supreme authority and takes all important decisions. The Board only interprets these decisions and implements them. Thus the Board acts on the lines prescribed by the Ministry of Power of the Govt. of India. The present NTPC Board has a similar status and comes only next in the administration. It is the Minister who formulates all policies and decides all matters. The technical policies which are formulated by the Board are in fact subpolicies which aim at facilitating the execution of the main policies formulated by the Minister. Thus the NTPC Board does not function as a policy-making Board but plays a second fiddle under the Minister of Power.

The principles of selection to the Board are not well-defined and seem to be defective. Too much weightage is given to seniority. Although seniority may be a sound criterian but to ignore merit may not serve a fruitful purpose. Herbert Morrison's view that the Board should be composed of the best brains that we can get is quite relevant to the

composition of the NTPC Board. The policy of the constitution of Board need to be reformulated if the Board wants to assert its functional autonomy.

It is suggested that the Board should be reorganised. The Board Members should be given an opportunity to exchange their ideas with people having a lot of business experience. It will certainly prove beneficial to the organisation. An outsider can be nominated to the Board with business experience without regard to seniority. The Board may thus obtain the services of those who are experts in business in running public sector undertakings as well as academicians from ITI's and Universities whose experience and counselling would prove valuable to it.

The present practice of nominating members to the Board who are on the verge of retirement is not sound. The Minister can hardly expect to get the right type of suggestions from persons who have reached their retirement age. Thus the appointment to the Board should not be made solely on consideration of seniority. Members on the Board should be re-appointed for a fixed tenure. A fixed term ensures a smooth flow of fresh mind and expertise on the Board and creates a sense of responsibility and dynamism in the Members.

The Personnel Department of the NTPC, which has authority in matters of policy-making for recruitment, should raise the standard of qualifications of staff recruited for project sites. Recruitment policy should make it compulsory for every employee of this class to have a technical Diploma or vocational course training as the minimum condition for eligibility of service. This in turn would save a lot of time in training.

There is also an urgent need to reconstruct and redesign the training programme of the NTPC and to update the existing training programmes with new technological changes. This is the primary responsibility of the Personnel Department so that the working of the NTPC operation may easily turn towards optimum efficiency.

A great drawback of training institutions run by NTPC is that sometimes the officers are appointed as teachers or lecturers in the training institutions without any attempt at finding out the suitability of such officers for the teaching profession. An officer may or may not have the capacity to teach. Teaching is an art which requires a lot of experience specially in the teaching field. Hence, there should be a positive selection process for the appointment of a teacher or lecturer for training purposes.

The promotion programmes also have some defects. The present promotion scheme for placing the junior administrative grade staff in the senior scale gives much weightage to the confidential report. Sometimes it happens that the officers who prepare this report, do not like an employee for personal reasons although he is competent, hard working and has the ability to face the situation with confidence. But the confidential reports does not favour him. This leads to frustration in his career and affects the overall morale of the workforce. The confidential report should not be the only determining factor of promotion, rather the authority should follow a procedure where merit should be the determining factor of promotion.

Except in a few cases promotion in the NTPC is based on seniority. Although seniority may be a reasonable criterion, it alone should not be

relied upon. Merit too has its claims. Both seniority and merit should form the basis of the promotion policy. Here it is suggested that both the criteria should be kept in mind while making promotions. When there are two employees of equal seniority, merit should be the deciding factor in a promotion policy. Where there are two employees of almost equal competency, seniority should be the decisive factor. Such a policy would satisfy the management which prefers ability or merit and the Trade Union which prefers seniority. It will also give satisfaction to the employees.

The employees should be motivated through the appreciation of work, introduction of workers participating scheme, etc. so that they feel as partner in the organisation and not the worker themselves.

Congenial environment, cordial and healthy relationship between the management and the employees in an undertaking play an important role in increasing its productivity and efficiency. This is possible when the management and the workforce interact in a spirit of mutual trust and confidence and without causing friction. No organisation can run efficiently or effectively if there is turmoil in industrial relations. It is, therefore, necessary that management should always adopt a welfare attitude towards its employees and the workers should also possess positive attitude and identify with the objectives of the organisation.

Improvement in the management would bring better performance and results and will go a long way in supplementing the efforts to bring about an overall improvement in the operative parameters like, generation and plant load factor and other services.

There are certain areas related to workers safety and welfare which need focus in the NTPC. Kayamkulam combined cycle power station uses naphtha as a primary fuel. Naphtha is a very dangerous fuel because of its high explosive properties. It is highly vulnerable to catch fire even at room temperatures. Prolonged exposure to naphtha leads to nausea, dizziness, skin irritation etc. Hence, the use of naphtha is very risky for the employees. In this regard NTPC should take necessary safety measures so as to avoid this situation and should develop alternatives.

Moreover, checklists should be prepared for ensuring that nothing related to naphtha is left unchecked. Further these checks should be applied on daily, weekly and monthly basis. If any defects are found in these checklists they should be immediately brought to the notice of the maintenance team for rectification. Wherever possible, non sparking tools for maintenance should be used for ensuring that naphtha does not catch fire. Even when ordinary tools are used, they should be dipped in water before use to make them free of sand etc. so as to avoid sparking.

It is important to suggest that power plant safety committee members should keep a regular watch on the naphtha handling areas and corrective measures, when necessary, should be taken as soon as possible. Separate fencing should be provided around licensed area and vehicle movement should be restricted in licensed area only. Smoking which requires use of matchboxes and lighters, should be prohibited inside the premises. It is also observed that the working of NTPC will be adversely affected if the payment of Railways outstandings is not cleared by the

Corporation. It is suggested that prompt payment should be made by NTPC authority to the Indian Railways.

Mechanical, Electrical, Civil and auxiliary equipments are procured by NTPC from outside through different standard companies. In this process the NTPC suffers from delays resulting in loss of time, money and sometime opportunity. It is suggested here that the NTPC should go in for diversification of their business insofar as to produce equipment and other necessary input required by it. This will further enhane the efficiency of this enterprise.

Outstanding dues of NTPC against Electricity Boards aggregated to Rs. 19,128.63 crores during 2000-01 and the amount is increasing everyday. NTPC should take adequate steps for recovery of its dues. This amount can be recycled for further growth, diversification, expansion and effective operations of the enterprise.

Auxiliary plants need power supply for their initial operation in order to be able to generate power later. There is thus an immediate need to ensure uninterrupted supply of electricity to auxiliary plants which, in turn, improve the productivity and working of this important public sector undertaking, the NTPC.

Implementation of development projects takes too much time and therefore it is required that the effort should be made on continuous basis to reduce the gestation period in project implementation. It will ensure the quality of work and economy in expenditure.

Attention need to be focused on the operation and maintenance of power plants to improve their working. The need of the hour is that the concerned authority should take all necessary steps to ensure the maintenance of the power plant and updation of all sorts of equipment so that proper supply of electricity could be possible and interruptions in the supply of power get avoided.

Some power stations which are acquired by the NTPC are using old machine and equipments. Generally old equipment and machinery reduce the efficiency. Here it is observed that the NTPC should take necessary steps in regard to introducing new machinery and equipment. This would improve the working efficiency and productivity of the power stations.

A number of inputs are being supplied to NTPC, like oil, coal and equipment, etc. These input suppliers have a kind of commercial pressures on NTPC to realise their dues from time to time in that they demand that they should be given power supply free of cost by the NTPC. Such a tendency should be totally stopped. In this regard it is suggested that the NTPC should go in for creating or generating its own resources to meet its input requirements. Only then such pressure could be avoided.

In thermal power stations, sufficient water is required for cooling purposes. Sometimes in summer, water in required quantity is not available which hampers the working of the NTPC. Recently few steps have been taken in this regard by the NTPC and the Corporation has introduced new system for cooling which requires small amount of water. Here it is observed that the NTPC should make such system of cooling compulsory for every

thermal power station so that their working is not adversely affected due to lack of water.

NTPC is a prestigious umbrella organisation in the power sector of the nation. It has not only augmented the power generation capacity in the country but has also chiefly contributed to the expansion of national power sector by establishing new power stations. It has also rendered valuable technical help to organisations engaged in the power generation, transmission and distribution in the country. The organisation, thus, plays a pivotal role in India's economic development. The Corporation needs further strengthening to exploit its potential to the fullest extent and if the measures suggested above are introduced, there is every reason that the NTPC's working capacity will undergo a tremendous improvement and enlargement. The Corporation would then be able to successfully meet the present challenges of shortage of power and immensely contribute to the economic advancement of the country.

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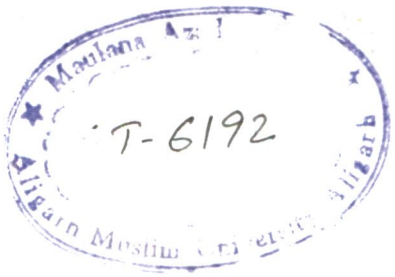

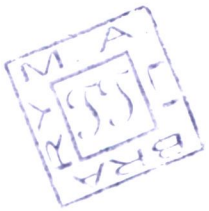

Dedicated to

My father

Er. Noor Mohd. Khan

THESIS

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DEPARTMENT OF COMMERCE
ALIGARH MUSLIM UNIVERSITY, ALIGARH—202002

Date : 5/12/03

CERTIFICATE

This is to certify that the work embodied in this thesis entitled **"A Study of Organisation and Working of NTPC Since 1991"** is the bonafide work carried out by **Miss Darakhshan Anjum** under my supervision and is suitable for submission for the **Ph.D. degree in Commerce** of Aligarh Muslim University, Aligarh.

Imamul Haque

Dr. S.M. Imamul Haque
(Reader)

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I express my profound sense of gratitude to my supervisor **Dr. S.M. Imamul Haque**, Reader, Department of Commerce, Aligarh Muslim University, Aligarh for his valuable guidance and encouragement at every stage, which has enabled me to complete this work. His depth of knowledge, wide experience of research and writings, participation in national and international seminars and conferences have been of immense intellectual support to me in the completion of this thesis. He has, infact, been a source of constant inspiration for me. I am extremely grateful to him for spending a lot of precious time out of his busy schedule to discuss various facets of this work. Without his kind supervision this work would have not taken its present shape.

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Darakhshan Anjum

DARAKHSHAN ANJUM

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BHEL	:	Bharat Heavy Electrical Limited
BTPS	:	Badarpur Thermal Power Station
BU	:	Billion Unit
CCPPs	:	Combined Cycle Power Plants
CEA	:	Central Electricity Authority
CENPEEP	:	Centre for Power Efficiency and Environmental Protection
CERC	:	Central Electricity Regulatory Commission
Ckt.Km	:	Circuit Kilometers
CMD	:	Chairman and Managing Director
EIA	:	Environment Impact Assessment
FGUTPS	:	Feroze Gandhi Unchahar Thermal Power Station
FSTPP	:	Farrakka Super Thermal Power Project
GAIL	:	Gas Authority of India Limited
HBJ	:	Hazira, Bijapur and Jagdishpur
HOD	:	Head of Department
ICB	:	International Competitive Bidding
ICICI	:	Industrial Credit and Investment Corporation of India
IDBI	:	Industrial Development Bank of India
Kh.STPP	:	Kahalgaon Super Thermal Power Project
KSTPP	:	Korba Super Thermal Power Project
KV	:	Kilo Volt
kWh	:	Kilo Watt Hour
LNG	:	Liquefied Natural Gas

MoP	:	Ministry of Power
MoU	:	Memorandum of Understanding
MU	:	Million Unit
MW	:	Mega Watt
NCTPP	:	National Capital Thermal Power Project
NEEPCO	:	North-Eastern Electric Power Corporation
NHPC	:	National Hydro-electric Power Corporation
NTPC	:	National Thermal Power Corporation
ONGC	:	Oil and Natural Gas Commission
PAPs	:	Project Affected Persons
PFC	:	Power Finance Corporation
PGCIL	:	Power Grid Corporation of India Limited
PLC	:	Plant Level Council
PLF	:	Plant Load Factor
PMI	:	Power Management Institute
PMS	:	Paryavaran Monitoring System
PPA	:	Power Purchase Agreement
PSEs	:	Public Sector Enterprises
PSU	:	Public Sector Undertaking
PTC	:	Power Trading Corporation
RAP	:	Rehabilitation Action Plan
ReAP	:	Remedial Action Plan
REC	:	Rural Electrification Corporation
R&D	:	Research and Development
R&M	:	Renovation and Modernisation
R&R	:	Resettlement and Rehabilitation

RSTPP	:	Ramagundam Super Thermal Power Project
SAIL	:	Steel Authority of India Limited
SBI	:	State Bank of India
SEBs	:	State Electricity Boards
SERC	:	State Electricity Regulatory Commission
SLC	:	Shop Level Council
SLC	:	Standing Linkage Committee
STPP	:	Super Thermal Power Project
TNEB	:	Tamil Nadu Electricity Board
TPS	:	Thermal Power Station
UPSEB	:	Uttar Pradesh State Electricity Board
USAID	:	United States Agency for International Development
VSTPS	:	Vindhyachal Super Thermal Power Station

CHAPTER - 1

Introduction

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INTRODUCTION

Power is the most vital contributory factor to economic development and social transformation specially for developing countries of the world. Without the availability of power, the great strides taken by the society in industry, transport and agriculture would have been unimaginable. In fact, power, transport and communication represent three important infrastructural sectors which determine the level of industrial and economic development of a country. Amongst the important parameters applied to assess and ascertain the overall growth and development of the country, power occupies a pivotal place. The most preferred and cheaper form of producing energy is the one that can be generated by exploiting natural resources. Because of its cost effectiveness and most convenient way of generating energy, its demand has been increasing much faster than that of other forms of energy generation.

In the beginning, the power supply industry was unevenly scattered around the country in the form of small power plants owned by numerous utilities. These power plants aimed at profit as their main motive. The social obligations were, however, only incidental to their operations. The physical growth and development of power was in doldrums and the economy of the country was almost stagnant. Therefore, the greatest challenge at the time of independence was to promote the power sector and to accelerate its resources so as to help achieve the objectives of socio-economic development as envisaged in the national five year plans. Accordingly, the government activated all the resources towards speedier economic

development of the country alongwith the availability of power so as to meet its galloping demand for energy during the plan periods in a systematic and planned manner. In spite of allout efforts made by the government, the burgeoning requirement of power has always outstripped its availability resulting in a chronic power shortage in the country. As a consequence of this, the government made attempts to attain self-sufficiency in power generation. With this end in view, the government made certain structural changes in the Electricity (Supply) Act, 1948 during the Fifth Five Year Plan. As a result, the National Thermal Power Corporation (NTPC) came into being in November 1975 under the Central Public Sector with the prime objective of planning, promoting and organising the integrated development of power in the country by establishing super thermal power stations. Since then, the NTPC is engaged in installation of coal and gas based power plants alongwith the associated transmission system.

The foregoing discussion reveals that the NTPC is a torch bearer organisation in the power sector of the country which is committed to enhance the generation of power and its transmission towards attaining self sufficiency in power requirements of the nation and thereby contribute to the economic growth and development of the country. But in recent years India has been facing shortage of power and in some of its States the power-supply situation has become very acute and grim causing civil commotion and decline in industrial output. There have been dharnas, traffic jam and accusation of failure of power policy of the government. The situation is thus, indicative of an investigation into the role of NTPC and to trace out

possible bottlenecks that have caused the present alarming situation in the power sector of the country.

In the present work entitled "A study of organisation and working of NTPC since 1991", an attempt has been made to look into the organisation of NTPC and evaluate its working since 1991 when India embarked upon introducing economic reforms, which threw challenges, particularly to Indian industry, to increase productivity as well as output in order to be able to face competition on home turf from the foreign players invading the Indian markets.

Objectives of the Study:

The focus of the study is on the following objectives:

1. To go through the power sector in India.
2. To review the organisational structure of NTPC.
3. To study the working of NTPC.
4. To suggest appropriate measures to streamline and improve the overall efficiency of NTPC.

Review of the Literature

A review of similar studies in the context of NTPC reveals that with the exception of a few studies and scanty articles written in newspapers and magazines, very little work has been done in respect of this organisaiton. The notable among them are :

Goel, M.M. [1987] in his book "Administration and Management of Electricity in India" dealt with the management aspect of electricity generation and distribution in India with reference to Haryana Electricity

Board in particular. The study focused on the 'Electricity (Supply) Act, 1948' which provides the creation of State Electricity Boards. It also covers in its ambit the whole range of issues, viz., Constitutional status of electricity Boards, organisation and working of State Electricity Boards, administrative hierarchy, industrial relation, consumers' satisfaction, financial, material and personnel management as well as the Indian Electricity (Amendment) Act 1986.

Mehetre, M.G. [1990] conducted a study on "Energy Crisis in India". He dwelt on the energy problems by making a review of the consumption and supply of commercial energy, sources of energy in India and discussed various aspects of the energy crisis. The study is very useful in formulation and execution of the government plans in respect of energy production, generation, consumption and conservation in India.

Sengupta, M. [1985] in his book entitled "Energy and Power Policies in India" highlights the various energy resources of India, dwells on the electric power industry, and coal industry and projects the present and future requirements of energy in India. His work also sheds light on the nuclear industry and petroleum industry as prospective sources of energy and makes the national socio-economic analysis in a broad perspectives.

Nag, P.K. [2001] in his book "Power Plant Economics" deals with the economics of setting up power plants. The steam cycles and optimisation of relevant cycle parameters have been analysed deeply. Elaborate details and updated information on combined cycle power generation have also

been included. Different types of fuel and their combustion attributes have been discussed in detail in his work.

Prakash, J. [1990] conducted a study on "Administration of Public Enterprises in India". He has commented on the growth profiles of about half a dozen Public Enterprises. Social and human resource accounting and privatisation of Public Enterprises have also been included in his study. But he did not cover any aspect of National Thermal Power Corporation.

Brech, E.F.L. [1952] in his book entitled "Principles and Practice of Management" discussed the various principles of management. The author dealt with the basic concept of management. He stressed that application of management principles is essential in assessing management's performance and achievement of organisaiton's goal.

Harold, K. and Cyrill O'Donnel [1974] in his book entitled "Essential of Management" conducted a study of the nature and application of management science, planning, general kinds of plans, organizing, staffing, nature of directing, motivation, communication, leadership. His last part of the work is devoted to the managerial function of controlling which is emphasized as an instrument of effective management.

Bhushan, Y.K. [1996] in his book "Fundamentals of Business Organisation and Management" has shed light on the government and business, Public Enterprises, industrial relations, securities market and institutional financing of industry. In the other part of his work, principles and functions of management have been discussed in detail. However organizational structure has not been covered.

Whitehead, G. [1978] in his book entitled "Business and Administrative Organisation" conducted a study on organisation, types of organisation, mixed economy works and functions within an organisation. But his work did not cover the organisational structure.

Jain, C.P. [2002] in his article entitled "Illuminating the Nation" has focused on the electricity generation projects under construction, new projects of NTPC cleared by the Central Electricity Authority for execution and feasibility reports submitted to Central Electricity Authority for finalisation but did not deal with the working of NTPC.

Singh, R. [1999] in his study "Change - agent in Power" addressed the environmental improvements, changes in technology and management in the power sector and made a comparison of plant load factor between All India and NTPC till 1998-99. He however, did not suggest any measures to increase the plant load factor.

Jain, C.P. [2003] report on "NTPC's Initiatives" points out that the number of power stations belonging to State Electricity Boards are performing below fifty per cent plant load factor. NTPC, on its own, offered to study the problem and the requirements of different power stations through their operation services group and offered to help the respective State Electricity Boards in the revamp of the power station concerned. This report also dealt with the joint ventures of NTPC with the other companies.

Jain, C.P. [2002] in his article "The Power Sector" has highlighted the power sector's financial bottlenecks, performance of NTPC, awards given to Rihand Power Project's workmen for the year 2001. The article identified the areas where special attention was needed.

Jain, C.P. [2002] in his other article entitled "Overhauling the Power Sector" focused on the area of distribution reforms putting forth specific initiatives for reducing the cross subsidies, maximising the utilisation of existing capacity through renovation and modernisation and supplementing supply side initiatives with effective demand side management of power sector but did not focus on NTPC.

Geethe, A. [2003] in his report on "Reforming Power" indicated that there was a clear need to assess performance of the States objectively on a scientific basis using various parameters that adequately reflect the agenda for reforms and actual implementation of the same in achieving a commercial basis of operations. The focus of the study was on evolving a performance framework across different States which would benchmark them on a common platform. The Ministry of Power announced its plan to carry out the reforms process during the Tenth Plan period. The study however, did not cover the key elements of this plan.

Qasim, S.Z. [1993] in his study entitled "Energy Scenario and the Eighth Plan" stressed the need for augmenting energy production and maximising energy conservation. The author observed that all the projects connected with these two aspects must be implemented sooner than later. Also, intensive efforts should be made to expand the hydel power in the country.

Joshi, S.K. [1993] in his article "New Technologies for Meeting Energy Requirement" emphasised the need to intensify the Research and Development efforts in the renewable sources of energy. The future strategy for energy should be flexible and rational one, he opines.

Ghosh, T.K. [1993] in his work entitled "Coal : A Unique Natural Resource" highlighted the importance of coal in national economy, and observed that modern civilization heavily depended on coal as it is one of the main sources of energy. He, however, did not cover coal supply to NTPC and importance of coal in the field of thermal power.

Mohan, C. [2003] in his article "North East India" made an analysis of the power shortage, estimated total peak demand in the seven States of the North East and focused on transmission and distribution weaknesses in the electricity industry in the North East region.

Prasad, Y. [2002] in his article "Clear Vision for the Future" addressed the issues of human resource policies adopted by organisations to retain employees, and also discussed the non-economic incentives offered by the National Hydro Power Corporation in detail but did not cover the generation, consumption and distribution of hydro electric power at all.

Nayyer, S.K. [1993] in his article on "The National Power Scene" finds that power generation programme in the country has made phenomenal progress with the advent of the Five Year Plans. Yet, the power shortage continues due to ever increasing demand. He advocates participation of the private sector in power generation. His study, however, did not cover distribution and transmission aspect of power sector.

Shahi, R.V. [1999] conducted a study on "Options for New Structure" and pointed out that power policy for generation projects in private sector would not succeed unless it is preceded by extensive privatisation of distribution and in this context described only Maharashtra's BSES Limited.

Ansari, S. [1991] conducted a study on "Financial Structure of Thermal Units under the NTPC". The study has deeply analysed the financial aspects of the NTPC, but did not cover the other areas of NTPC, e.g. working, organisational structure of NTPC etc. Moreover, his thesis cover the period from 1982 to 1991.

Singh, R. [2001] in his thesis on "Foreign Investment in India's Infrastructural Sector" makes a brief mention of NTPC but has not covered the working and organizational structure of NTPC.

The present research work entitled "A Study of Organisation and Working of N.T.P.C. since 1991" is not a rehash of the studies mentioned above. None of the different books, reports and theses reviewed above has tried to examine in critical details the present organizational structure and working of N.T.P.C. in the context of liberalisation, expansion and strengthening of the N.T.P.C. as an important organisation in the power sector so as to cope with the emerging electrical energy requirements of the nation. The purpose of this study is to fill up this gap. The study is based on the following hypotheses :

Hypothesis:

The proposed study makes an attempt to substantiate the following hypothesis.

1. That the overall working of N.T.P.C. is satisfactory.
2. That the organizational structure of N.T.P.C. is quite conducive to its effective working.

3. That the performance of N.T.P.C., administratively and financially has been sound and contributory to its growth.

4. That the N.T.P.C. has played a catalystic and torch bearing role in power generation and in the expansion and strengthening of the national power sector.

Methodology Adopted :

Significant part of the study depends on secondary sources. But information has also been obtained from primary sources which include interviews, comments, observations, opinion, notes, etc. of the persons concerned with the power sector. The primary information was also gathered through discussion with persons in NTPC. Materials for the present study were collected from the published records available in the library of Ministry of Power; NTPC Bhawan, Scope Complex Library, New Delhi; Engineering Office Complex Library, Noida; Maulana Azad Library and Seminar Library of the Department of Commerce, Aligarh Muslim University. Various magazines, journals, annual reports and periodicals, have also been gone through to derive information pertaining to the present study.

Limitations of the Study :

Nothing is perfect so is this study. The present study suffers from certain limitations. The study is based on the information from secondary sources which reduce the degree of reliability. However, attempt has been made to collect maximum information from the official record of power sector undertakings in general and NTPC in particular on the various aspects

of the study. Most of the departments neither publish the information nor do they allow the outsiders an access to their records, internal workings etc. on the pretext of maintaining secrecy. This restricts the data availability. It was difficult to collect all the necessary data from grass-root level. Although the researcher tried her level best but the latest information could not be obtained. Moreover, different sources of information give different data, hence there was no uniformity in the data.

Presentation of the Study :

Keeping in view the objectives, hypothesis and methodology of the study the whole work has been divided into seven chapters. The first chapter deals with the introduction of the study. Its objectives are to make a survey of the studies carried out in the field of India's energy sector in general and the National Thermal Power Corporation in particular. Different objectives of such studies, their thrust, and findings have been reviewed in this chapter. The second chapter deals with the power sector in India. A detailed historical background, functioning and performance of the power sector so far has been discussed. The third chapter carries out the brief profile of NTPC. It covers the power projects, primary fuel and adoption of new technology by the NTPC. The fourth chapter examines the organisational structure of NTPC. The fifth chapter critically discusses the working of the NTPC. It covers generation, consultancy services and corporate functions of NTPC. The sixth chapter analyses and interprets the working of NTPC. Finally the seventh chapter summaries the whole study. It presents conclusions and make suggestions based on the main findings of the study and in the direction of enhancing the efficiency of the NTPC.

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CHAPTER - 2

Power Sector in India - An Overview

CHAPTER – 2

POWER SECTOR IN INDIA – AN OVERVIEW

Power is the basic foundation for the economic development of a country. It plays a crucial role in industry, agriculture, households, and railways and therefore, consumption of power in the country is an indicator of productivity and growth. So growth of the Indian economy depends heavily on the performance and development of the power sector. In view of this, power development has been given high priority in development programme.

Indian economy provides a unique blend of modern and traditional forms of technology. This is also true of major energy consuming sectors of the economy such as industry, agriculture and transportation. The forms of energy range from nuclear on the one hand to agriculture and animal waste on the other. A substantial part of energy requirements in the country has been traditionally met from non-commercial sources, like wood, agricultural waste, animal dung etc. These non-commercial sources account for about 60 per cent of total energy consumption.

In India on 20th of July, 1879 an Englishmen, Mr. Flury, for the first time demonstrated an electric bulb to the people of Calcutta, by using a steam engine run dynamo. During festivals and marriages the Indian aristocracy and rich class used electricity to illuminate their premises by hiring a dynamo from Dey Sheel and Co. of 36-Wellington Square, Calcutta.[1] Most of the electrical installations in India in the early years were established for meeting the domestic and industrial need of urban areas.

Power development in India commenced at the end of the 19th Century with the commissioning of electricity supply in Darjeeling during 1897, followed by commissioning of a hydro power station at Sivasamudram in Karnataka during 1902.[2] The first steam power plant in the country was set up in 1899 at Calcutta to meet the power requirement of the metropolis. The first big step towards water-power utilization in India was to run cotton mills, at Gokak in 1886.[3]

The steam engine run dynamo were expensive and the necessity to set up power plants was felt. Therefore, in 1895 the work on Sidrabong hydel power project in Darjeeling with an installed capacity of 135 KW began, which was completed in 1897. On November 10, 1897 the plant was commissioned and inaugurated by the acting Lt. Governor of Bengal, C.C. Stevens.[4] During this period, electricity supply industry was in the hands of private sector which had only a profit motive in running the industry; the social obligations were only incidental to their business.[5]

Introduction of electricity in Darjeeling and Calcutta town created a sensation in the Princely States of India. They started vying each other to have the electricity in their States. The demand for electricity, thus, increased which forced the then Govt. of India to install new plants in several places in the country. As a result in 1902 the electric power was introduced in Mysore[6]; in 1906 in Travancore State; in 1908 in Kashmir and Delhi; 1909, in Madras; in 1912, in Shimla in 1915, and so on many other parts of the country were electrified.

In 1910, the first Indian Electricity Act was enacted. Its main objective was to regulate the function of individual private undertakings. This Act was based on a similar Act of 1887 in the United Kingdom. This Act, did not have the coordinated development of power in the country. The need for such coordination was felt over the years and by 1945 the government was aware of the necessity of new legislation. As a consequence of the recommendation of various committees on electricity, the Electricity (Supply) Act, 1948 was passed. It was drafted with the assistance of experts from the United Kingdom and drew mainly on British experience and the British Act of 1919 and 1926. The object of Act was "to provide for the rationalisation of the production and supply of electricity, for taking measures conductive to electrical development and all matters incidental thereto".[7]

Upto 1920 progress was rather slow, but after that date the industry made rapid strides and continuous expansion. The total electricity generating capacity nearly doubled-from one million kW in 1939 to 1.71 million kW in 1950. The total electricity generated also increased from about 2,500 million kWh to 5,100 million kWh during the same period. Approximately 60 per cent of the electric generating capacity was in coal burning stations, 32 per cent in hydro-electric stations and the remainder in oil burning stations. The installed capacity of hydro installations is about 60 per cent that of the steam installations, the units generated by the hydro-electric plants was about 110 per cent of those generated by the latter. The availability of electricity in 1950 to towns and villages in India has been furnished in Table 2.1.

TABLE 2.1

Availability of Electricity in 1950 to Towns and Villages

Population Range (1941 - Census)	Total No. of Town or Villages	No. of Towns or Villages with Public Electricity Supply	Percentage of Towns or Villages with Public Electricity Supply to Total
Over 100,000	49	49	100.00
100,000 – 50,000	88	88	100.00
50,000 – 20,000	277	240	86.64
20,000 – 10,000	607	260	42.83
10,000 – 5,000	2367	258	10.86
Below 5,000	559062	2792	0.50

Source : The First Five Year Plan, Govt. of India, Planning Commission, New Delhi.

Table 2.1 reveals that all towns with a population of 50,000 and over, and most of those with population above 20,000 were supplied with electricity. Rural electrification on the other hand, had made very little progress. Out of approximately 5,60,000 villages in the country, only about 3,000 or one in about 200 was served with electricity. This development, moreover, was confined mainly to Mysore, Madras and Uttar Pradesh and was associated in each case with the development of hydro-electric power.

Electricity has a great scope in India in the development of agriculture and related activities. Since 1933 when State tube-well schemes were first taken up in Uttar Pradesh, there has been an increasing demand for electricity for tube-well pumping. Further, as a part of the "Grow More

Food Campaign", pumping units have been installed on rivers or wells for agricultural purposes. The supply of cheap electric power is essential for large scale development of tube-well or lift irrigation from rivers.

In 1948 about 35 per cent of the electric energy generated by the Ganga Canal Grid in Uttar Pradesh (about 61 million kWh) was utilized for pumping of irrigation supplies with about 2,200 tube wells, owned and operated by the State. In 1949 there were about 12,500 such consumers in Madras State alone, and they took about 11.2 per cent of the energy sold by the public utilities.

Obviously, electricity is one of the vital requisites for the overall development of the economy and is therefore, appropriately called as the wheel of development. It is required for subsistence and for economic growth without which the objectives of improving quality of life and social security cannot be achieved. On the eve of independence India had an installed capacity of 1,362 MW of which 854 MW was of thermal power and 508 MW of hydel power. The total generation of electricity was 4,073 MUs of which 1,879 MUs was of thermal power and 2,194 MUs of hydel power.[8] India's per capita consumption of electricity was very low i.e., one/ two hundredth that of the world.

Although power development was initiated in India as early as 1900 with the commissioning of hydro-electric power stations at Shivasamudram in Karnataka but progress was not impressive till independence. When the national government took over after independence in 1947, it set for itself the task of providing electricity in every town and

village of the country. Specific provision and fund allocations were made in the Five Year Development Plans of the Govt. of India from 1951 onwards. The constitution of India enables the present State Government to create public corporation for purposes of undertaking industrial and trading activities in power generation transmission and distribution. It has given sufficient place to power sector by including the subject in the concurrent list. The actual upliftment in the power scenario in India infact started from the year 1951. Power generation programme, however, made phenomenal progress with the advent of Five Year Plans.

POWER SECTOR DURING PLAN ERA :

The Planning Commission was constituted on March 15th, 1950, by the Govt. of India and the planned economic development in India began from 1951 with the inception of the First Five Year Plan. At the launch of the First Five Year Plan in 1951, power generation was recognized as a major input for the country's economic development and was accorded high priority.

The development and growth of power sector under each Five Year Plan is discussed in the pages that follow :

First Five Year Plan

The First Five Year Plan was implemented on April 1, 1951. During this plan, construction of a number of major river valley projects like Bhakra-Nangal, Damodar valley, Hirakund and Chambal valley was taken up. These projects resulted in the stepping up of power generation. Under this plan provision was made to spend a total sum of Rs. 2,378

crores during the plan period. But the actual utilization amounted to Rs. 1,960 crores only. At the end of this plan, the generation capacity stood at 34.2 lakhs kW.[9]

Second Five Year Plan

This plan was started on April 1, 1956 and ended on March 31, 1961. The emphasis in the Second Five Year Plan was on the development of basic and heavy industries, and the related need to step up power generation. The installed capacity at the end of the Second Five Year Plan reached 57 lakhs kW. During this plan, the actual public sector outlay was Rs. 4,672 crores which included Rs. 3,731 crores as government investment and the remaining Rs. 941 crores as government outlay. Besides, an investment of about Rs. 3,100 crores was estimated for the private sector.

The first two plans focussed on hydro electric power (as component of multi-purpose projects). Subsequent plans emphasized on rapid installation of thermal power stations.

Third Five Year Plan

This plan started on April, 1961 and ended on March 31, 1966. The main objective of the Third Plan was to expand the basic industries like steel, chemical industry, fuel and power etc. By the beginning of the Third Five Year Plan every State had a State Electricity Boards (SEBs). All the assets and functions previously held and performed by the State Public Work Departments were transferred to these boards. During Third Plan, emphasis was on extending power supply to rural areas. A significant development in this phase was emergence of inter-State grid system. The

country was divided into five regions to promote power development on a regional basis. A Regional Electricity Board was established in each region to promote integrated operation of constituent power system.

Fourth Five Year Plan

The Fourth Plan started on April 1, 1969 and ended on March 31, 1974. It emphasized the need for Central participation in expansion of power generation programmes at strategic locations in a big way to supplement the activities in the State sector.

In the Fourth Plan, the commission of the Tarapur power station in 1969 was of great significance in the nuclear development programme and the country became the ninth nuclear nation in the world.[10] The progress during the period covering the Third Plan, the three Annual Plans and the Fourth Plan was substantial with installed capacity rising to 184.6 kW comprising 69.7 lakhs kW from hydro-electric projects, 108.5 lakhs kW from thermal power project and the balance of 6.4 lakhs kW from nuclear plants.

Fifth Five Year Plan

The Fifth Five Year Plan began on April 1, 1974. The main objective of this plan was the 'Eradication of Poverty and to attain Self-sufficiency'. Also, National Programme of minimum needs in which primary education, drinking water, nourishing food, electrification of the villages and cleanliness of dirty suburbs were included.

The generation of power in the country after independence, till late seventies, had been predominantly through the State Electricity Boards

which were created under the Electricity (Supply) Act, 1948. However, to meet the growing demands for power and to enable the optimum utilization of energy resources, the Govt. of India decided to take up a programme of establishing large thermal power stations in the Central Sector in the country with a view to supplement the efforts of the State sector in accelerating thermal power development. In view of the massive capital outlays, sophisticated technology and high degree of technical and managerial expertise involved in the construction, operation and maintenance of these large size thermal generating station, the Govt. of India decided to set up National Thermal Power Corporation Limited (NTPC), a separate organization in the Central Sector during this plan.[11]

The NTPC came into being on the 7th November, 1975 as a thermal power generating company in the Central Sector. Besides generating thermal power, it was also assigned the responsibility for construction and operation of large thermal power stations along with the associated transmission systems to cater to the power requirement of various States in the regions.

Sixth Five Year Plan

The Sixth Plan laid emphasis on the rapid development of the domestic sources of energy and stressed the need for production and efficient utilization of the energy sources. During this plan, the addition of 14,226 MW in the installed capacity of power plants represented an increase of 49.4 per cent over the total installed capacity of 28,448 MW at the beginning of the Sixth Plan. Delays in the commissioning of projects,

extending in some cases to several years for reasons varying from poor project management to lack of funds were noted as the bottlenecks in the smooth development of power sector. Towards the end of the Sixth Plan, a comprehensive Renovation and Modernisation (R&M) programme for poorly functioning thermal power plants was approved under a centrally sponsored scheme at an estimated cost of Rs. 500 crores. As a result of the slippage in the capacity additions, unsatisfactory performance of the thermal stations partly due to non-completion of transmission lines[12] were checked and improvement brought about.

Seventh Five Year Plan

The objective of the Seventh Plan was set at the energy protection and development of non-traditional energy sources. Besides, delays in the commissioning of projects, extending in some cases to several years for reasons varying from poor management to lack of funds were also dealt with in the Plan. The target of additions to the installed capacity for the Seventh Plan was fixed at 22,245.25 MW comprising thermal 15,999 MW, hydel 5,541.25 MW and nuclear 705 MW.[13] The largest allocation in the Seventh Plan was in the power sector.

Eighth Five Year Plan

This plan had the spread over the period April 1, 1992 to March 31, 1997. The Plan laid stress on making improvement in the operation of the existing thermal generation units. Under this Plan, there was a provision of making total outlays of Rs. 7,98,000 crores on power sector.[14] During this plan 16,422.6 MW of new generation capacity could be added as

against the target of 30,538 MW. This was lower than the capacity addition of 21,401 MW achieved during the Seventh Plan.

Ninth Five Year Plan

The shortfall in power capacity addition kept rising over the years and its effects came to fore in the Ninth Plan. The Approach Paper to the Ninth Plan therefore proposed to undertake the following steps for the development of the power sector during the Plan period.

First, the State and the Central utilities would ensure speedy completion of the ongoing projects and take steps for new projects. Secondly, further decline in the share of hydel power would be prevented by providing adequate financial resources to complete ongoing hydel power projects speedily.

Thirdly, during the Ninth Plan alternative models for restructuring the SEBs would be explored. This has become necessary to overcome the problem of their financial sickness. Fourthly, emphasis would be placed on rural electrification programmes and accordingly transmission and distribution facilities will be augmented. Finally, particular attention would be given to sort out the problems in the nuclear power sector. This is important as nuclear power has the potential of being a very cost effective option in the long run.[15]

The Planning Commission had fixed a target of 40,245.2 MW for capacity addition during Ninth Plan. Out of this total addition of 40,245.2 MW envisaged during the Plan period, 11,909 MW would be in the Central

sector and 10,747.7 MW would be in the State sector which works out 29.6 per cent and 26.7 per cent of the capacity addition respectively. A capacity addition of 17,588.5 MW, constituting about 43.7 per cent of the capacity to be added during the Ninth Plan, was proposed to be in the private sector. A capacity addition of 40,245.2 MW in the public utilities has been targeted for the Ninth Five Year Plan period. The achievement against this target so far during the first four years of the Plan period were 3,226 MW, 4,242 MW, 4,507 MW and 3,776 MW respectively. In this Plan a large share of additional requirement will, therefore, have to come from the private sector.[16]

With the liberalization of Indian economy, the power sector has been made open to the private sector, and it is expected that the rate of growth of power generation capacity will be faster than envisaged in the five year plans.

Tenth Five Year Plan

The Working Group on power constituted by the Planning Commission has envisaged a feasible capacity addition programme of 46,939 MW in the Tenth Plan. This comprises of 17,311 MW hydro, 28,328 MW thermal and 1,300 MW nuclear. The overall fund requirement during the Tenth Plan would be of the order of Rs. 3,52,000 crores for generating capacity addition. The Working Group has identified that 12,290 MW thermal capacity addition is feasible in Central Sector during Tenth Plan. Out of this, 9,160 MW capacity addition has been allocated to NTPC,

which constitute about 74 per cent of thermal capacity addition in Central Sector.

The hydropower development would need further boost in order to bridge the gap between demand and supply. During the forthcoming Tenth and Eleventh Plans, the vision paper envisages a hydel capacity addition of over 30,000 MW. The likely requirement of funds for this capacity addition over the decade would be of the order of 1,300 billion rupees. In terms of hydropower potential, India ranks fifth in the world at 600 billion kiloWatt hour of energy annually, equivalent to a name plate capacity of 1,50,000 MW approximately, out of which only 17 per cent has so far been developed.

The Planning Commission was given the additional responsibility to prepare the power plans along with the general plans for the country for a duration of five years. Therefore, since 1950-51, the commission has been preparing the power plans and is also estimating and allocating the required funds to implement the plan, through the yearly budgetary allocations.

Plan Outlays for Power Sector

Power sector is highly capital intensive and investment in this sector constitutes a substantial share of the total plan outlay in the country. It has always been on the priority in the Indian planning as reflected by each Five Year Plan outlays. Table 2.2 below presents the Plan outlays for power sector made in each of the development Plan of the Govt. of India.

TABLE 2.2

PLAN OUTLAYS FOR POWER SECTOR

(Rs. in Crores)

Plan	Period	Outlay	Share of Power Outlay (per cent)
First Plan	1951-56	260	13.3
Second Plan	1956-61	460	9.8
Third Plan	1961-66	1252	14.6
Three Annual Plans	1966-69	1213	18.3
Fourth Plan	1969-74	2932	18.6
Fifth Plan	1974-79	7400	18.8
Annual Plan	1979-80	2241	18.4
Sixth Plan	1980-85	18299	16.7
Seventh Plan	1985-90	37895	17.3
Annual Plan	1990-91	25906	21.0
Eighth Plan	1992-97	79589	18.3

Source : 1. Sundram I.S. : Power Planning : Problem & Prospects, Monthly Commentary, 1997, p. 44.

2. Planning Commission : Working of SEBs (Nov. '97).

Table 2.2 reveals that the outlay in power sector went up from Rs. 260 crores in First Five Year Plan to Rs. 79,589 crores in the Eighth Five Year Plan, indicating a significant growth of more than 305.11 times. Similarly, as per share of power outlays increased from 13.3 per cent in the First Five Year Plan to 18.3 per cent in Eighth Five Year Plan. The allocation on power development was low during the first three plans between 9.8 to 14.6 per cent of the total outlay. The low priority given to power development was sought to be justified at that time, on the ground

that industries had not come up so fast and that progress in rural electrification and in the use of electric power in the railway transport system was tardy.

Power Sector : Planwise Targets and Achievements

In the field of power, specific targets were fixed for generation and distribution of electricity from all processes. However, these targets remained short of full achievement in electric generation. Table 2.3 shows the shortfall during the Plan periods.

TABLE 2.3

Planwise Power Generation Targets and Achievements

(in MW)

Plan	Period	Additions		Short fall (%)
		Target	Achievement	
First Plan	1951-56	1300	1100	15.4
Second Plan	1956-61	3500	2250	36.0
Third Plan	1961-66	7040	4520	35.8
Annual Plan	1966-69	5430	4120	24.1
Fourth Plan	1969-74	9264	4580	50.0
Fifth Plan	1974-79	12499	10202	18.4
Annual Plan	1979-80	2945	1799	38.9
Sixth Plan	1980-85	19666	14226	27.7
Seventh Plan	1985-90	22245	21402	3.9
Annual Plan	1990-91	4212	2777	34.1
Eighth Plan	1992-97	30538	16422	46.2

Source : 1. Draft Fifth Five Year Plan, 1974-79, Vol. II.
2. The Hindu : Survey of Indian Industry, 1997.

Table 2.3 depicts the planwise shortfall in the achievements of targets set for additions to the installed capacity during the Five Year Plans. The Planning Commission set a target of 1,300 MW capacity addition during the First Five Year Plan but the actual achievement of 1,100 MW was 15.4 per cent less than the target. The highest shortfall was 50 per cent during the Fourth Plan period where the target was fixed at 9,264 MW but the achievement was 4,580 MW. During the Fourth Plan, the investment in power sector was 18.6 per cent of the total plan outlay even then the target was not fully achieved. The lowest shortfall in capacity addition was 3.9 per cent during the Seventh Plan period. The target fixed for the Eighth Plan was 30,538 MW but only 16,422 MW of addition could be made in the generating capacity. The shortfall thus, accounted for 46.2 per cent which was on account of a host of factors which became the biggest hurdle in the way of additional capacity creation. Reasons for this shortfall include paucity of funds, procedural delays, non-resolution of inter-State disputes, unresolved issue of fuel linkages and resettlement and rehabilitation problems.

Table 2.4 indicates the growth in the installed capacity of power generation in the country from 1950-51 to 2000-01.

TABLE 2.4

GROWTH OF INSTALLED CAPACITY (UTILITIES)

(in Mega Watt)

Year	Installed capacity			
	Hydro	Thermal	Nuclear	Total
1950-51	600	1100	-	1700
1960-61	1917	2736	-	4653
1970-71	6383	7906	420	14709
1980-81	11791	17563	860	30214
1990-91	18840	46241	1565	66646
1991-92	19194	48086	1785	69065
1992-93	19576	50749	2005	72330
1993-94	20379	54369	2005	76753
1994-95	20833	58113	2225	81171
1995-96	20976	60067	2225	83288
1996-97	21658	61157	2225	85040
1997-98	21891.03	64150.78	2225	89166.87
1998-99	22443.26	68584.78	1840	93253
1999-2K	23627.38	69474.76	1840	97845
2000-01	25141.78	73628.30	2860	101630

Source : Govt. of India, Ministry of Power, Annual Report 2001-02, New Delhi.

Table 2.4 reveals that there is a slow but consistent growth in hydel and thermal installed generating capacity. The all India installed capacity of electric power generating stations under utilities in the country recorded

a massive increase of more than 5878 per cent, i.e. from 1,700 MW in 1950-51 to 1,01,630 MW in 2000-01 consisting of 25,141.78 MW hydro, 73,628.30 MW thermal, 2,860 MW nuclear. The hydel plant capacity of power generation has considerably gone up from 600 MW in 1950-51 and 25,141.78 MW in 2000-01, registering an overall increase of nearly 4090 per cent or 41.9 times more during the period under review. Thermal plant generating capacity was recorded at about 73,628.30 MW in 2000-01 as compared to the capacity of 1,100 MW in 1950-51 which registered an improvement of more than 6593 per cent or more than 66 times over the period. The capacity of nuclear power plant was 420 MW in 1970-71 and the same rose to a figure of 2,860 MW in 2000-01, indicating a rise of roughly 580 per cent or 6.8 times more during the same period.

The Electricity (Supply) Act of 1948 led to the setting up of State Electricity Boards which were given the total responsibility of generating, transmitting and distributing power within their respective States.[17] Keeping in view the overriding priority and importance of energy, the Govt. of India carved out a separate Ministry of Energy in 1985. The Ministry of Energy comprises the Department of Power, the Department of Coal and the Department of Non-conventional Energy Sources.

As a first step towards providing an effective administrative machinery for the development of power sector the Govt. of India established the Ministry of Power and Non-conventional Energy sources comprising the Department of Power and Non-conventional Energy sources with effect from 24th June 1991. It was further bifurcated into two separate Ministries, namely Ministry of Power and Ministry of Non-conventional

Energy sources with effect from 2nd July 1992. The Central Electricity Authority constituted under the Electricity (Supply) Act, 1948, advises the Department of Power on all technical, financial and economic matters relating to power sector.

The Govt. of India, in 1992, had formulated a package of incentives to attract private participation in the power sector. The package provided that :

- All private companies entering the electricity sector will be allowed a debt-equity ratio of up to 4:1.
- Promoters' contribution should be at least 11 per cent of the total outlay.
- Foreign equity participation up to 100 per cent permitted.
- Licencees of longer duration of 30 years in the first instance and subsequent renewals of 20 years etc.[18]

The Electricity Regulatory Commissions Act was passed in April 1998 with a view to providing for the establishment of the Central Electricity Regulatory Commission (CERC) and State Electricity Regulatory Commission (SERC). The CERC has been constituted with the objective of regulating the tariff of generating companies owned or controlled by the Central Government, and inter-State transmission tariff of the transmission entities. The Electricity Bill 2001 has been introduced in Parliament in August, 2001. The Bill seeks to replace the three existing Acts, viz., the Indian Electricity Act, 1910, the Electricity (Supply) Act, 1948 and the Electricity Regulatory Commissions Act, 1998. The main

features of the Bill are as follows :

- The Central Government to prepare a National Electricity Policy in consultation with State Government.
- Generation being delicensed and captive generation being freely permitted. Hydro projects would, however, need approval of the State Government and clearance from the Central Electricity Authority.
- Transmission Utility at the Central as well as State level, to be a government company - with responsibility for planned and coordinated development of transmission network. Provision for private transmission licensees.
- Distribution licensees would be free to undertake generation and generating companies would be free to take up distribution licensees.
- Metering of all electricity supplied made mandatory.
- Provisions relating to theft of electricity made more stringent, etc.[19]

The Union Ministry of Power has decided to come up with a comprehensive legislation so as to put together in one place all the legislative measures required to push the sector onto a trajectory of sound commercial growth. It takes into account the move towards a competitive scenario, where regulators on the one hand and private power utilities on the other shall play increasingly significant roles. The Bill provides a comprehensive yet flexible legislative framework for power development.

Power Generation in the Country

Electricity in bulk quantities is produced in power plants, which can be of the thermal, nuclear, hydraulic and geothermal. Thermal power generation plays an important role in providing reliable and continuous sources of power. Historically hydel power was the main source of electricity in India. However, with the modest beginning, thermal power has made its on place in the power sector of India. Progress of electricity generation, during the period 1950-51 to 2000-01, has been computed in Table 2.5.

TABLE 2.5

POWER GENERATION IN INDIA

(in Million Units)

Year	Power Generation			
	Thermal	Hydro	Nuclear	Total
1950-51	2596	2523	-	5119
1960-61	9100	7837	-	16937
1970-71	28162	25248	2417	55827
1980-81	61301	46542	3001	110844
1990-91	186452	71535	6244	264231
1991-92	208551	72599	5561	286711
1992-93	224485	69833	6748	301066
1993-94	248189	70463	5396	324048
1994-95	262130	82712	5646	350488
1995-96	296906	72513	7965	380084
1996-97	316869	68609	9010	394488
1997-98	336104	74476	10042	420622
1998-99	353662	82703	12015	448380
1999-2K	386226	80533	13252	480011
2000-01	408208	74346	16896	499450

Source : Energy Management, Power Line Magazine, Sept., 2002, New Delhi.

Data set out in the table 2.5 presents the overall power generation in the country. The figures indicate that power generation in the country has increased from 5,119 MUs during 1950-51 to 4,99,450 MUs during 2000-01. During 2000-01 the power generation was 4,99,450 MUs comprising 4,08,208 MUs thermal, 74,346 MU, hydro and 16,896 MUs nuclear. The target of power generation for 2001-02 was fixed at 530 billion units. The share of thermal generation in total power generation in the country has been increasing by leaps and bounds, i.e., from 2,596 MUs in 1950-51 and reached a record figure of 4,08,208 MUs in 2000-01, a tremendous increase of around 15624.5 per cent or 157.2 times more. The power generation from hydel power plant went up from 2,523 MUs in 1950-51 to 74,346 MUs in 2000-01, showing an approximately rise of 2846.7 per cent or 29.46 times more. Similarly, the power generation from nuclear power plant rose from 2,417 MUs in 1970-71 and it touched the figure of 16,896 MUs in 2000-01, indicating an overall increase of more than 599 per cent or 6.99 times more. The total power generation in the country went up by more than 9656.7 per cent or 97.5 times more. The power generation from thermal plant is steadily increasing year by year. But the power generation from hydel and nuclear power plants though register an overall increase, the growth is however punctuated by decreases here and there over the course of five decades.

Sector-wise Consumption of Electricity

Various sectors of economy consume electricity. Power consumption is required for commercial as well as non-commercial uses. Commercial uses of power refer to the use of electric power in industries, agriculture and transport. Non-commercial uses include electric power required for domestic lighting, cooking and use of domestic electronic gadgets like the refrigerators, air conditioners, etc. The consumers of electricity may be grouped into six categories, viz., household, agriculture, industries, transport, commercial and others. Break-up of sectoral electricity consumption is presented in Table 2.6.

Table 2.6

Sector-wise Consumption of Electricity in India

(Per cent)

Category	1950-51	1960-61	1970-71	80-81	90-91	91-92	92-93	93-94	94-95	95-96	96-97	97-98	98-99
Domestic	12 6	10 7	8 8	11 7	16 8	17 3	16 4	15 5	15 6	15 9	16 4	16 8	18 4
Commercial	7 5	6 1	5 9	5 7	5 9	5 8	4 0	4 4	4 5	4 4	4 5	4 7	4 9
Agriculture	3 9	6 0	10 2	16 8	26 4	28 2	29 9	31 2	32 4	33 5	32 5	31 3	30 0
Industry	62 6	69 4	67 6	58 8	44 2	42 0	35 5	34 8	34 7	32 5	33 9	32 6	33 6
Railways	7 4	3 3	3 2	2 8	2 2	2 2	1 8	2 1	2 1	2 0	2 2	2 3	2 1
Outside State	-	-	-	-	-	-	2 1	1 9	1 8	1 8	1 5	1 2	1 2
Others	6 0	4 5	4 3	4 2	4 5	4 5	10 3	12 2	8 9	9 9	9 0	9 2	9 8
Total	100 0	100 0	100 0	100 0	100 0	100 0	100 0	100 0	100 0	100 0	100 0	100 0	100 0

Source 1 Govt of India, Ministry of Finance, Economic Division Economic Survey 1987-88, 1998-99

2 Ninth Five Year Plan, India Infoline com, Feb 2, 03, p 2 of 3

From table 2.6, it is evident that the industrial sector is the major consumer of electricity. It accounted for nearly 34 per cent in 1998-99 of the total power generation followed by the agriculture 30 per cent and domestic sector accounted for nearly 18.4 per cent. The lowest power was consumed by the railway traction i.e. 2.1 per cent during the year 1998-99. The share of domestic consumption of electricity in total consumption has gone up from 12.6 per cent in 1950-51 to 18.4 per cent in 1998-99. Due to increasing domestic load, the peak load demand is increasing faster than the energy demand. The share of commercial sector in total power consumption declined from 7.5 per cent to 4.9 per cent during the period under review. Likewise, the share of industrial sector in total power consumption has also declined alarmingly i.e. from 62.6 per cent in 1950-51 to 33.6 per cent in 1998-99 partly due to increasing reliance of the industrial sector upon captive power plants. Yet industry remains the biggest consumer of electricity and its share in the overall electricity consumption accounted for 33.6 per cent in 1998-99. The share of agriculture sector in total power consumption steadily went up from 3.9 per cent in 1950-51 to 30 per cent in 1998-99. The consumption of electricity by domestic consumers and for public lighting, water works etc., also increased but only marginally from 12.6 per cent to 18.4 per cent over the corresponding period of five decades.

Shortage of Power in India

Most of the regions in the country are plagued with power shortages leading to erratic and unreliable supply. The country has been seriously and continually facing the problem of power-cuts. Figures

regarding requirement, availability and deficit have been displayed in Table 2.7.

TABLE 2.7

REQUIREMENT AND AVAILABILITY OF POWER IN INDIA

(in Million Units)

Year	Requirement (Demand) (1)	Availability (Supply) (2)	Deficit (1-2)	% of Deficit to requirement
1980-81	120118	103734	16384	13.6
1990-91	267632	246941	20691	7.7
1991-92	288974	269136	19838	6.9
1992-93	305266	282384	22882	7.5
1993-94	323252	303681	19571	6.1
1994-95	352260	329255	23005	6.5
1995-96	389721	356441	33280	8.5
1996-97	413490	365900	47590	11.5
1997-98	424505	390330	34175	8.1
1998-99	446584	420235	26349	5.9
1999-00	480430	450594	29836	6.2
2000-01	507216	467400	39816	7.8

Source : 1. CMIE, Energy March-April 1999; Govt. of India, Ministry of Power, Annual Report 1998-99.

2. Govt. of India, Minsitry of Power, Annual Report 2001-02, New Delhi, p. 8.

Table 2.7 shows the shortage of power which indicates a wavering trend from 1980-81 to 2000-01. Requirement of power in 1980-81 was 1,20,118 MUs and availability was 1,03,734 MUs leaving a gap between demand and supply of 16,384 MUs or 13.6 per cent. Power shortage continued to persist in the country. Due to slow growth of capacity addition during the Eighth Five Year Plan the power shortage which was 8.3 per cent at the end of 1992-93 increased to 11.5 per cent at the end of 1996-97. The supply side, however, showed improvement in subsequent years and the shortfall of power decreased to 6.2 per cent in 1999-2K. However, the reduction in power shortfall at a time when industry was going through recessionary conditions was not conducive to economic growth. The all India average shortage during 2000-01 stood at 7.8 per cent.

Plant Load Factor of Thermal Plants

The Plant Load Factor (PLF) is an important indicator of operational efficiency in thermal power plants. Table 2.8 shows the PLF of thermal power stations in the country from 1991-92 to 2000-01.

TABLE 2.8

PLANT LOAD FACTOR

(Figure in %)

Year	Plant Load Factor			
	Central Sector	State Sector	Private Sector	All India
1991-92	64.5	50.6	56.7	55.3
1992-93	62.7	54.1	58.8	57.1
1993-94	69.2	56.6	57.0	61.0
1994-95	72.3	55.0	65.9	60.0
1995-96	70.9	58.0	72.3	63.0
1996-97	71.2	60.3	71.0	64.4
1997-98	70.4	60.9	71.2	64.7
1998-99	73.6	60.7	68.0	64.6
1999-00	73.6	63.7	68.9	67.3
2000-01	74.3	65.6	73.0	69.0

Source : Energy Management : Powerline Magazine, International Print-O-Pac Ltd., New Delhi, Sept., 2002, p. 95.

Data set out in the table 2.8 indicate the PLF of the Central sector, State sector, Private sector and for India as a whole. The average PLF in the Central Public Sector Undertakings was appreciably higher than that achieved by all the SEBs. The data on PLF is however, marked by fluctuations over the period 1991-92 to 2000-01. All India PLF of thermal plants was 55.3 per cent during the year 1991-92 and it rose to 69 per cent in the year 2000-01. The PLF of thermal units of all India recorded the

highest achievement during the year 2000-01. All India PLF of thermal plants is mostly in increasing order. The average PLF of the power plants in India works out around 70 per cent during the year 2000-01. The increase in power generation during the late nineties, in spite of a fall in the rate at which additional capacities were being set up, was largely because of a steady and healthy increase in the PLF of thermal plants. The all India average PLF increased from 55.3 per cent in 1991-92 to 57.1 per cent in 1992-93 and to an impressive 61 per cent in 1993-94. In the subsequent year however, the average PLF of thermal plants decreased marginally to 60 per cent during 1994-95 as against a target of 63 per cent. The PLF during 1996-97 was 64.4 per cent which further rose to 64.7 per cent in 1997-98. Statewise, the Andhra Pradesh SEB had the highest PLF of 85.1 per cent, followed closely by Rajasthan at 85 per cent. Bihar's performance was the worst, with PLF of only 15.4 per cent in 2000-01 as is borne out from Appendix-I which presents the PLF statistics in respect of individual States.

ORGANIZATIONS UNDER MINISTRY OF POWER

Under the aegis of the Ministry of Power, Government of India, a number of Corporation are functioning in the area of power sector. Their operation spread over a wide spectrum which include power generation and distribution, financial assistance to power projects, undertaking rural electrification works, etc. Some of them not only cater to satisfy domestic demand for power but also export electricity to neighbouring countries. These organisation are briefly profiled as under.

1. National Hydro-Electric Power Corporation Limited (NHPC)

The NHPC was set up in 1975 as a private limited company with an authorized capital of Rs. 200 crores. It became a public limited company in 1986. NHPC is the single largest organization for hydro power development in India. With an investment base of over Rs. 1,58,000 million, NHPC is among the top ten companies in the country in terms of investment.[20] Its underground construction capabilities get demonstrated with the following completed/under construction works :

- 20 tunnels with diameters of 2 m to 11 m totalling about 90 km in length.
- 12 shafts with diameters of 4.75 m to 25 m having depths of 60 m to 310 m.[21]

Works on the mega Indira Sagar project in Madhya Pradesh was also on schedule. NHPC is supplying power to 23 beneficiary States and union territories apart from exporting power to Nepal from its Tanakpur project.[22]

Power Finance Corporation Limited (PFC)

PFC was incorporated on 16th July 1986 and was declared a public financial institution in 1990. The main objectives of the Corporation include financing of power generation projects, transmission and distribution works, renovation and modernization of power plants, system improvement and energy conservation schemes, maintenance and repair of capital equipment. The authorized share capital of the Corporation is Rs.

200 crores and paid-up capital is Rs. 1,033.45 crores. The funds provided by the Corporation are in the nature of additionality to Central Plan allocation and based on the merits of the individual project. The Corporation was registered as a Non-Banking Financial Institution by Reserve Bank of India in Feb., 1998.[23]

Rural Electrification Corporation Limited (REC)

REC was established in 1969 as a wholly owned Govt. of India enterprise with the primary objective of providing financial assistance for rural electrification in the country. Rural electrification programmes financed by the Corporation cover electrification of villages including tribal villages and dalit bastis, energisation of pumpsets, provision of power for small, agro-based and rural industries, lighting to rural households and street lighting (Appendix-II).

North Eastern Electric Power Corporation Limited (NEEPCO)

NEEPCO was constituted in 1976 under the Company's Act 1956. The main objectives of the NEEPCO are to add the power generating capacity in the north eastern region by installing hydro and thermal power plants, to ensure optimum utilization of commissioned generation projects, to generate adequate internal resources ensuring justifiable return on investment, to continue sustained efforts to obtain the receivable from SEBs/Departments and to undertake long terms feasibility studies for optimum development of hydro power resources of the north eastern region. Out of the total installed capacity of 1,785.72 MW (Grid) in the north eastern region, NEEPCO is contributing a total of 700 MW

(comprising 375 MW of thermal and 325 MW of hydro power) thus meeting more than 40 per cent of peak demand/energy needs of the region.[24]

Power Trading Corporation of India Limited (PTC)

PTC was set up in 1999. This New Delhi-headquartered PTC commenced trading on a sustained basis in 2001 with the supply of 160 MW from West Bengal Power Development Corporation Limited to Delhi and Haryana. It started with an authorized capital of Rs. 1.5 billion when it was incorporated. It had a paid-up equity capital of Rs. 240 million, which it received from three companies – Rs. 120 million from PGCIL and Rs. 60 million each from the NTPC and PFC. PTC's main function is to catalyse development of mega power projects by acting as a single entity to enter into Power Purchase Agreement (PPA) with Independent Power Producers on the one side and Multipartite PPAs with users/SEBs under long term arrangement on the other. PTC has embarked upon trading by organizing purchase of power from surplus locations and selling to deficit SEBs. Delhi is the single largest buyer of power from PTC, accounting for nearly 40 per cent of the total power purchased from the Corporation. Haryana and Karnataka follow with 16 per cent and 10 per cent of power purchase respectively.[25] (Appendix-III).

Power Grid Corporation of India Limited (PGCIL)

PGCIL was incorporated as a Govt. of India enterprises on 23 Oct., 1989. The mission of the Corporation is establishment and operation of regional and national power grids to facilitate transfer of power within and

across the regions with reliability, security and economy on sound commercial principles. As on 21 March, 2002, POWERGRID is operating about 40,550 ckt.km. of transmission lines. The transmission system availability is maintained consistently over 98.5 per cent by deploying best operation and maintenance practices at par with international utilities and today POWERGRID is one of the largest transmission utility in the world.[26]

Foreign Direct Investment (FDI) in Tramission

Out of the Rs. 8,00,000 crores required for doubling the power capacity to 2,00,000 MW by the year 2012, about Rs. 2,00,000 crores would be required for the associated transmission system including creation of a National Grid. Out of this, an investment of about Rs. 70,000 crores would be required in Central Sector Transmission Systems alone. POWERGRID is expected to mobilize an investment of Rs. 41,000 crores from its own resources. The balance requirement of Rs. 29,000 crores is proposed to be mobilised through private investment. Considering the scale of investment and the volume of expansion required, attracting large private investment in transmission is essential. The Govt. of India amended Indian Electricity Act and Electricity Supply Act in 1998, to enable private sector participation in transmission sector.

National Thermal Power Corporation Limited (NTPC)

The NTPC, New Delhi, was set up in 1975 as a Central Sector generating company for the development of thermal power. NTPC is a schedule 'A' 'Navratna' Company having a total approved investment of Rs. 50,409.22 crores. It representing about 26 per cent of the all India

thermal capacity. At present NTPC has to its credit thirteen coal based thermal power projects and seven gas/liquid fuel based combined cycle projects.

In brief, power is the fuel of economic progress. It is prime mover of economic growth and development. A nation's economic progress can indeed be measured by the expansion of power supply. The wider use of power increases industrial production and raises the standard of life. No industrial development or even large scale food production, water supply, manufacturing activity or construction of building etc. is at all possible without adequate supply of power.

Power development in India commenced at the end of the 19th Century with the commissioning of power supply in Darjeeling. In the pre-independence era, the power supply was mainly in the private sector that too was restricted to the urban areas. The Electricity (Supply) Act was enacted in 1948 which brought a revolution in India's power sector. With the formation of State Electricity Boards during Five Year Plans, a significant step was taken in bringing about systematic growth of power supply industry all over the country. NTPC being the hub of activities related to power industry in India, a comprehensive profile of this organization is presented in the next chapter.

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CHAPTER - 3

N.T.P.C. - A Brief Profile

CHAPTER – 3

NTPC – A BRIEF PROFILE

The generation of power in the country after independence, till late seventies, had been predominantly through the State Electricity Boards which were created under the Electricity (Supply) Act, 1948. However, to meet the growing demands for power and to enable the optimum utilisation of energy resources, the Government of India decided to take up a programme of establishing large thermal power stations in the Central sector in the country with a view to supplement the efforts of the State sector in accelerating thermal power development. In view of the massive capital outlays, sophisticated technology and high degree of technical and managerial expertise involved in the construction, operation and maintenance of these large size thermal generating station, the Government of India decided to set up National Thermal Power Corporation Limited (NTPC), a separate organisation in the Central sector.[1] NTPC is a hundred per cent government owned Public Limited Company, incorporated under the Companies Act 1956. The registered office of the company is situated at Delhi.

The NTPC was incorporated in November, 1975, as a Central generating company, with the objective of planning, promoting and organising the integrated development of thermal power generation and execution in thermal power projects. At the same time, National Hydro-Electric Power Corporation was incorporated with the main objective of planning, promoting and organising the integrated development of hydro-electric power in India.[2]

In order to meet the demand of the thermal power capacity, a site selection committee was appointed by the Govt. of India in 1988 to identify suitable new sites for the setting up of large thermal power stations in different regions of the country. The Committee visited 31 sites identified for locating large thermal power plants each of capacity 1,500 MW and above. Out of these sites only 18 sites were found suitable for locating the thermal power plants for a total capacity of approximately 40,000 MW. Even with this addition, the shortfall was of 41,000 MW which demanded more sites to be identified.[3]

Vision of the NTPC

NTPC has been established as a front runner organisation in the Indian power sector. This thermal power Corporation has been envisaged to be one of the largest and best power utilities of the world. It is looked at to play a leading role in power generation and management in the country and thereby contributing to India's emergence as one of the world's leading economies.[4]

Mission of the NTPC

The Corporate mission of NTPC is to make available reliable and regular power to the nation in increasingly large quantities. Towards this end, the company will spearhead the process of accelerated development of the power sector by planning and expeditiously implementing power projects and operating power stations economically and efficiently. In doing so the company will also seek opportunities for augmenting power generation through tie-ups with other organisations in the area of

conventional energy sources and additionally through non-conventional energy sources. The Corporation will contribute to all round sector improvement by sharing its experience and expertise with other organisations. The company will participate in the execution of the power projects abroad, if necessary in collaboration with other reputed organisations.[5]

Aims and Objectives of NTPC

In pursuance of the vision and mission, the Memorandum of Association of NTPC clearly defines the aim and objectives of the company as follows :

"To plan, promote and organize an integrated and efficient development of thermal/hydel power and power through non-conventional/ renewable energy sources in India and abroad including planning, investigation, research, design and preparation of preliminary, feasibility and definite project reports, construction, generation, operation and maintenance, renovation and modernization of power stations and projects, transmission, distribute, sale of power generated at stations in India and abroad in accordance with the national economic policies and objectives laid down by the Central Government from time to time".

The detailed objectives, which have been developed within the framework of NTPC basic objective, were incorporated in the Corporate Plan approved by the company's Board of Directors in July 1998. The primary objectives are :

- To add generating capacity within prescribed time and cost.

- To operate and maintain power stations at high availability ensuring minimum cost of generation.
- To maintain the financial soundness of the company by managing the financial operations in accordance with good commercial utility practices.
- To develop appropriate commercial policy leading to remunerative tariffs and minimum receivables.
- To function as a responsible corporate citizen and discharge social responsibility, in respect of environment protection and rehabilitation.
- The Corporation will strive to utilise the ash produced at its stations to the maximum extent possible through production of ash bricks building materials, etc.
- To adopt appropriate human resources development policy leading to creation of team of motivated and competent power professionals.
- To induce, assimilate and attain self sufficiency in technology, acquire expertise in utility management practices and to disseminate knowledge essentially as a contribution to other constituents of the power sector in the country.
- To develop research and development for achieving improved plant reliability.
- To expand the consultancy operations and to participate in ventures abroad.[6]

Core Values of NTPC

The core values of the Corporation are as follows :

- Customer Focus
- Organisational Pride
- Mutual Respect and Trust
- Initiative and Speed
- Total Quality

HR Vision of NTPC

The HR vision of NTPC is "to enable our people to be a family of committed world class professionals, making NTPC a learning organisation".[7]

Global Stature of NTPC

NTPC has been ranked as the sixth largest organisation in the world in terms of thermal power generation and is also ranked the second most efficient in capacity utilisation among the largest ten thermal utilities by Data monitor, UK who have compared the size and performance of utilities all over the world for the year 1998.[8] As per Asia Week's survey of top 1000 companies of Asia Pacific region including Japan NTPC improved its ranking to 295 in the year 2000 on sales (up from 299 in 1999). In India, NTPC ranks seventh in terms of sales and second in terms of profit.

The Corporation was set up with the task of setting up the Singrauli thermal power station alone. In 1976, the first super thermal power project at Singrauli was cleared by Govt. of India. A modest beginning, with strong

determination and high spirits, moving ahead, gathering pace and heading on to what is today projected as a benchmark in the power generation sector. NTPC - An organisation symbolising reliability, strength and a responsible growth was born. The expansion and advancement of the company was continuous and speedy.

Since the commissioning of its first generating unit in Feb. 1982 at Singrauli, the Corporation has gone on setting new standards in the area of project implementation. In the period when almost all PSU units in the public sector slackened and a downfall was witnessed in the private sector, NTPC performed well and received the accolades from the World Bank president's speech at Singrauli in August 1985, who said, "you are on time, you are within budget and you are generating profits. These are all phenomena and characteristics that the World Bank likes to be associated with".[9]

From the project implementation company its focus of operation concentrated to a power generating company where its performance was also excellent. The World Bank's performance Audit Report of 1993 stated, "NTPC record to plant construction, cost constainment and operating efficiency has been exceptional, while as an institution, it has opened new ground in organisation and management, successfully navigated the transition from construction to operating company and generally coped quite well with the problems of rapid expansion".[10]

The year 1978 saw the initiation of a lot of development activities in the country. Implementation of Ramagundam and Korba projects was

cleared by the Govt. of India. Construction of the Singrauli-Kanpur line of 400 KV initiated. Another opportunity came across in the form of the handover of Badarpur to NTPC by Central Government for better management and improved performance. The Farakka project was also approved by the government.

NTPC brought out a Corporate Plan in the year 1983 for the period 1985-2000. Changes, wherever necessary, were incorporated in it from time to time. This plan was instrumental in guiding NTPC in the right direction. It achieved great success in project implementation, generation and financing rapid growth till the late eighties.

In 1990, NTPC's first gas based combined cycle power plant at Anta, Rajasthan achieved full capacity. Year 1991 saw the commissioning of the first unit of the Dadri project. During 1991-92 the NTPC added an additional generating capacity of 788 MW. It took over the 420 MW Feroze Gandhi Unchahar thermal power project on Feb. 13, 1992, thus raising the total installed capacity of the Corporation to 11,333 MW on March 31, 1992.[11]

Also in 1992 the Unchahar project with a capacity of 420 MW was taken over from the Uttar Pradesh Rajya Vidyut Utpadan Nigam (UPRVUN). NTPC achieved a complete turnaround in the operation of the station. Two units with a capacity of 210 MW each were commissioned by NTPC after takeover. Kahalgaon project went on stream by synchronizing its first unit. The Kawas project with a capacity of 645 MW became fully operational by year 1993.

In 1994, the first unit of Jhanor-Gandhar gas project was synchronised. Also, the Centre for Power Efficiency and Environmental Projection was set up in this year with the following objective.

- To acquire state-of-the-art technologies and practises so as to optimise performance by plants.
- To improve efficiency and profitability of the plants.
- To reduce environmental pollution caused in generating thermal power.
- To achieve a synergy between environmental concerns and utility needs. The Centre proved a great help in minimising the environmental impacts of the stations and also preserving the natural ecology in the vicinity of the stations.

In 1995, the first 500 MW unit of Talcher super thermal power project was commissioned. By the year 1997, the government also approved the Simhadri project with a 1,000 MW capacity and the Faridabad gas project with a capacity of 430 MW.

By the year 1998, the first Naphtha based plant of the country at Kayamkulam with a capacity of 350 MW came on stream. During 1998-99 six out of the 10 best power stations in India belonged to NTPC.[12]

As on 31.12.2001 the authorised share capital of NTPC stood at Rs. 8,000 crores. The NTPC has a total approved investment of Rs. 50,409.22 crores in the power sector.

Table 3.1 shows the position of projects, approved capacity and commissioned capacity (in MW) of NTPC.

TABLE 3.1

Projects, Approved Capacity and Commissioned Capacity of NTPC

(in MW)

Project	Nos.	Approved Capacity	Commissioned Capacity
Coal	13	20480	15480
Gas/Liquid Fuel	07	3975	3955
Total	20	24455	19435

Source : GOI, NTPC, Nabinagar Thermal Power Project, New Delhi, p. 6.

Table 3.1 depicts that at present NTPC has thirteen coal based thermal power projects and seven gas/liquid fuel-based combined cycle projects. Approved capacity of coal project and gas/liquid fuel projects are 20,480 MW, and 3,975 MW respectively. The commissioned capacity of NTPC owned stations as on 31.12.2001 is 19,435 MW representing about 26 per cent of the all India thermal capacity.

Table 3.2 shows the details of the coal based project and combined cycle projects of the NTPC.

TABLE 3.2

Coal and Gas/Liquid Combined Cycle Projects of NTPC

S.No.	Project	State
	Coal Based Projects	
1.	Singrauli	U.P.
2.	Korba	Chhattisgarh
3.	Ramagundam	A.P.
4.	Farakka	W.B.

Contd...

5.	Vindhyachal	M.P.
6.	Rihand	U.P.
7.	Kahalgaon	Bihar
8.	NCTPP	U.P.
9.	Talcher STPP	Orissa
10.	Talcher TPS	Orissa
11.	Unchahar	U.P.
12.	Simhadri	A.P.
13.	Tanda TPS	U.P.
	Combined Cycle Projects	
1.	Auraiya	U.P.
2.	Anta	Rajasthan
3.	Kawas	Gujrat
4.	Dadri	U.P.
5.	Jhanor-Gandhar	Gujrat
6.	Kayamkulam	Kerala
7.	Faridabad	Haryana

Source : GOI, NTPC, Annual Report 2000-01, New Delhi.

Table 3.2 reveals that the Corporation has coal based thermal power projects at Singrauli, Rihand, Dadri (U.P.), Korba (Chhattisgarh), Vindhyachal (M.P.), Ramagundam (A.P.), Farakka (W.B.), Kahalgaon (Bihar), Talcher-Kaniha (Orissa), Simhadri (A.P.) and seven combined cycle gas power projects at Anta (Rajasthan), Auraiya, Dadri (U.P.), Kawas and Gandhar (Gujrat), Kayamkulam (Kerala) and Faridabad (Haryana). Besides its own stations, NTPC also manages the Badarpur thermal power station and Balco's captive power stations near Korba, Madhya Pradesh which was also constructed by NTPC.

Capacity Addition

Approved capacity of power projects of NTPC are Singrauli 2,000 MW, Rihand 2,000 MW, gas power project Dadri 817 MW, gas power project Anta 413 MW, gas power project Auraiya 652 MW, coal based

power project Unchahar 840 MW, Tanda 440 MW, gas power project at Faridabad 430 MW, National Capital Thermal Power Project (NCTPP) at Dadri 840 MW, coal based project Korba 2,100 MW, gas power project Kawas 645 MW, Vindhyachal 2,260 MW, gas power project Jhanor-Gandhar, Ramagundam 2,600 MW, Kayamkulam 350 MW, Simhadri 1,000 MW, Farakka 1,600 MW, Kahalgaon 840, Talcher Kaniha 3,000 MW, and Talcher thermal 460 MW.

As on 31.12.2001 NTPC had commissioned capacity of 19,435 MW at its various stations. Table 3.3 shows the capacity addition of NTPC.

TABLE 3.3

CAPACITY ADDITION OF NTPC

Project	State	Capacity Commissioned (MW)
Singrauli	U.P.	5x200 + 2x500
Rihand	U.P.	2x500
Dadri	U.P.	4x131 + 2x146.5
Anta	Rajasthan	3x88 + 1x149
Auraiya	U.P.	4x112 + 2x102
Unchahar	U.P.	4x210
Tanda	U.P.	4x110
Faridabad	Haryana	2x143 + 1x144
Dadri	U.P.	4x210
Korba	Chhattisgarh	3x200 + 3x500
Kawas	Gujrat	4x106 + 2x110.5
Vindhyachal	M.P.	6x210 + 2x500
Jhanor-Gandhar	Gujrat	3x131 + 1x255
Ramagundam	A.P.	3x200 + 3x500
Kayamkulam	Kerala	2x115 + 1x120
Simhadri	A.P.	-
Farakka	W.B.	3x200 + 2x500
Kahalgaon	Bihar	4x210
Talcher Kaniha	Orissa	2x500
Talcher Thermal	Orissa	4x60 + 2x110

Source GOI, Ministry of Power, Annual Report 2000-01, New Delhi

Table 3.3 depicts that the capacity addition of Singrauli is 2,000 MW, Rihand 1,000 MW, Dadri 817 MW, Anta 413 MW, Auraiya 652 MW, Unchahar 840 MW, Tanda 440 MW, Faridabad 430 MW, Dadri 840 MW, Korba 2,100 MW, Kawas 645 MW, Vindhyachal 2,260 MW, Jhanor-Gandhar 648 MW, Ramagundam 2,100 MW, Kayamkulam 350 MW, Farakka 1,600 MW, Kahalgaon 810 MW, Talcher Kaniha 1,000 MW, Talcher thermal 460 MW, while adding the capacity. NTPC has set certain high benchmarks in project management. The construction periods have been reduced through the use of Integrated Project Management and Control Systems (IPM & CS). The company is going ahead with an ambitious capacity addition programme and is poised to become a 30,000 MW plus company by 2007 (end of Tenth Plan).

Primary Fuel used by NTPC

Coal is one of the most important sources of energy. It has multipurpose uses. As a heating agent it is used as a fuel for boilers and steam engines. It is also used for generation of electricity in thermal power plants. The energy resources for generation of electricity in the country are coal and lignite, natural gas, nuclear power and hydroelectric potential. Currently, coal accounts for about 67 per cent of total power generation resources in the country and it is foreseen that due to limited domestic availability of natural gas and liquid fuels, coal will continue to be the main fuel for future power development programme in India. Over the years NTPC had been using Indian coal as the primary source of energy at the rate of approximately 68 million tonnes every year along with about 57,000 kilolitres of furnace oil as secondary fuel. Table 3.4 shows the primary fuel used in NTPC's power projects.

TABLE 3.4

PRIMARY FUEL OF NTPC PROJECTS

Region/Project/State	Primary Fuel
Northern Region	
Singrauli (U.P.)	Coal
Rihand (U.P.)	Coal
Dadri (NCTPP) (U.P.)	Coal
Dadri (U.P.)	Gas
Unchahar (U.P.)	Coal
Auraiya (U.P.)	Gas
Anta (Rajasthan)	Gas
Faridabad (Haryana)	Gas
Tanda (U.P.)	Coal
Western Region	
Korba (M.P.)	Coal
Vindhyachal (M.P.)	Coal
Kawas (Gujarat)	Gas
Jhanor-Gandhar (Gujarat)	Gas
Southern Region	
Ramagundam (A.P.)	Coal
Simhadri (A.P.)	Coal
Kayamkulam (Kerala)	Naphtha
Eastern Region	
Farakka I/II (W.B.)	Coal
Talcher (Kaniha) (Orissa)	Coal
Kahalgaon (Bihar)	Coal
Talcher (Orissa)	Coal
Farakka III (W.B.)	Coal
JVs with SAIL	Coal

Source : GOI, NTPC, Annual Report 2000-2001, New Delhi.

The region-wise, project-wise and State-wise fuel used by NTPC is evident from table 3.4. In northern region five power projects used coal viz., Singrauli (U.P.), Rihand (U.P.), Dadri (NCTPP) (U.P.), Unchahar (U.P.) and Tanda (U.P.); and four project used gas; in Dadri (U.P.), Auraiya (U.P.), Anta (Rajasthan) and Faridabad (Haryana). In western region, Korba (M.P.), Vindhyachal (M.P.) used coal and Kawas and Jhanor-Gandhar (Gujrat) used gas as primary fuel. In southern region, Kayamkulam in Kerala used naphtha and Ramagundam in A.P., Simhadri in A.P. used coal. In eastern region, all power project used coal which included Farakka I/II (W.B.), Talcher (Kaniha), Kahalgaon (Bihar), Talcher (Orissa), Farakka III (W.B.) and joint venture of NTPC with SAIL also used coal as a primary fuel. So primary fuel of NTPC are coal, gas and naphtha. But coal is predominantly used in many projects. It has become an important agent for thermal power generation. Naphtha is used only in Kayamkulam project in Kerala.

NTPC's Kayamkulam combined cycle power station is a 350 MW power station situated in Kerala. A unique feature of the plant is that it is only one of its kind among all other NTPC's power stations to use naphtha as the primary fuel. In other similar stations of NTPC, where naphtha is handled, natural gas is used as the primary fuel and naphtha is used only as a back-up fuel, when there is a shortage in gas supply. Kayamkulam combined cycle power station has the largest naphtha storage capacity. Naphtha is a very dangerous fuel because of its high explosive properties. It is highly vulnerable to catch fire even at room temperatures. Naphtha has a lower explosive limit of 1.1 per cent and a higher explosive limit of 5.9 per cent. This means that a small concentration of naphtha in air is sufficient to

explode in the presence of ignition sources. Naphtha is a health hazard too. Prolonged exposure to naphtha lead to nausea, dizziness, skin irritation etc. Hence people, handling naphtha are exposed to these risks. To avoid all above problems, NTPC should adopt safe handling practices of naphtha at Kayamkulam and other power stations also. The company should adopt the following practices when naphtha is used.

Checklists should be developed for ensuring that nothing related to naphtha is left unchecked. There should be daily, weekly and monthly checks. The checklist ensures that all safety aspects related to naphtha are taken care of and checked periodically. If any defects are found in these checklists, they should be bought to the notice of the maintenance team. Wherever possible, non-sparking tools should be used for doing maintenance on naphtha system. Even when ordinary tools are used, they should be dipped in water before use to make them free of sand etc. So as to avoid sparking while in use. The power plant safety committee members should keep a regular watch on the naphtha handling areas and corrective measures be taken as soon as required. Separate fencing should be provided around the licensed area. Vehicle movement should also be restricted in licensed area. Match boxes, cigarettes should not be allowed inside the premises.

Above suggestion are useful to develop confidence among people that naphtha can be handled with ease if proper safety measures are taken and a strict vigil is ensured.

Table 3.5 shows the fuel expenditure of NTPC between 1990-91 and 2000-01.

TABLE 3.5

FUEL EXPENDITURE OF NTPC

(Rs. in Crores)

Year	Expenditure on Fuel
1990-91	976.02
1991-92	1642.45
1992-93	2237.32
1993-94	2923.18
1994-95	3148.29
1995-96	3988.54
1996-97	4846.11
1997-98	6130.10
1998-99	6672.49
1999-00	8005.09
2000-01	9934.21

Source : GOI, NTPC, Annual Report, 2000-01, New Delhi, p. 80.

Table 3.5 gives information about the expenditure of NTPC on consumption of fuel i.e. coal, gas and naphtha. It is evident that the fuel expenditure of NTPC is constantly on rise. From Rs. 976.02 crores in 1990-91 the expenditure on fuel soared to Rs. 9,934.21 crores in 2000-01, registering an overall increase of about 917.82 per cent or more than ten times during the same period.

Thermal power stations use coal as the main fuel to generate electricity. To a little extent thermal power plants are also using gas and oil

as fuel these days. But in future the use of gas for power will increase considerably. With the discovery of gas in the country, coupled with the laying down of the 1,700 kms. Hazira, Bijapur, Jagdishpur (HBJ) gas pipeline by the Gas Authority of India Limited (GAIL), the gas based power plants have become a reality. Accordingly, these gas-based plant at Anta, Kawas and Auraiya, along the HBJ pipeline, have been commissioned with 513 MW, 652 MW and 106 MW capacity respectively. Another gas based unit has been commissioned at the Dadri gas plant with 262 MW capacity. The advantages of gas-based power plants are many. The most improtant being the cost and the short period in which these plants can be setup. Normally, it takes about 18 months to set up these plants against five years for a thermal and about ten years for hydel plants. The use of natural gas can bring about substantial saving in coal and petroleum products for generating energy.

Fuel supply

NTPC, thus, continues to be the biggest consumer of coal in the country for power generation. Coal consumed by NTPC stations including Badarpur thermal power station during the year 2000-2001 was of the order of 77.04 million tonnes which was 9.95 per cent more than its consumption in the previous year. Firm long-term coal linkages were granted for new power projects namely north Karanpura (3x660 MW), Barh (3x660 MW) and Dadri Stage-II (1x500 MW) during Long-term Standing Linkage Committee (SLC) meeting held on 15.12.2000. Further, "in-principle" coal linkage was accorded to Unchahar Stage-III (1x660 MW) in SLC meeting.

Negotiations for coal supply agreement for new projects are in advanced stage of finalization. Besides the negotiation on coal supply agreement, the NTPC is also actively pursuing development of Amarpali and Magadh block of coal mines linked to Barh and north Karanpura projects through a joint venture company with Coal India or its subsidiaries where NTPC plans to take an equity share of 10 per cent.

Availability of gas continues to be a constraint for capacity utilization of the gas-based power stations. During the year 2000-2001, the overall gas availability to gas-based power stations marginally improved and gas receipt was 11.43 MCMD against receipt of 11.36 MCMD last year. Liquid fuel receipt during the year 2000-2001 was to the tune of 8,63,375 KL as against a receipt of 8,25,094 KL in 1999-2000.

A 23 Km long pipeline of 14" diameter to link NTPC's Jhanor-Gandhar plant with HBJ pipeline was commissioned on 11th August, 2000 by GAIL at the behest of NTPC. This link has provided flexibility for diverting up to 2 MCMD of gas to NTPC's Jhanor-Gandhar gas power plant thereby improving its plant load factor.

Fuel Oil, Lubricating Oil and Welding

Fuel oil used in NTPC's thermal power stations are usually residual fuel oils (long residue left after atmospheric and vaccum gas oil distillation). These fuel oils have very high amount of asphaltene which tend to polymerise on storage and deposit in the fuel inlet system.

The lubricating oils and hydraulic fluids used in a modern power station are mainly petroleum based oils which are blended from highly

refined base stocks and contain antioxidant, anti wear, anti foam additives. In addition to petroleum based hydraulic fluids and lubricating oils, fire resistant phosphate esters which are synthetic in nature are used as control fluids in 500 MW turbines.

Welding is an important field in the NTPC's thermal power plants to enhance the equipment's service life and achieve significant economy by adopting preventive maintenance techniques in welding technology.[13]

Water Used in NTPC's Power Projects

Water is used for cooling purpose and consumptive purposes. The consumptive requirement is very small. For cooling purposes normally large quantities of water is required. However, in most of the NTPC stations, closed cycle cooling systems have been installed. In such cases only a small amount of make up water is required.

NTPC is adopting the concept of "Near Zero Effluent Discharge" for once-through ash disposal system. For conservation of water, Ash Water Recycling System has been envisaged for the ash pond in all new projects and also in some of its operating stations. NTPC has implemented the programme for changing ash disposal systems at some of its existing power plants from once-through system to recycling system where clear effluent from ash pond is recycled and only little quantity of blow down is required to be discharged after treatment. The ash water recycling system helps in conservation of fresh water supplies. The ash water recycling system has already been commissioned at Ramagundam, Talcher-Kaniha, Rihand and Kahalgaon. The scheme has helped in saving huge quantity of water per

hour. At few other stations similar ash water recycling systems are under implementation. Liquid wastes treatment plant is in service in Ramagundam (RSTPS), Kahalgaon (KhSTPS), Vindhyachal (VSTPS), Korba (KSTPS), Farrakka (FSTPS) and Feroz Gandhi Unchahar (FGUTPS) which is helping to maintain main plant effluent parameters well within stipulated limits of respective State Pollution Board.

Waste Management in Power Plant

As the world approaches the 21st Century, there is an increasing need to limit pollution discharge to maintain a safe environment. Electric utilities are today expected not only to deliver high quality of electricity to the customer stably and economically but also preserve the irreplaceable global environment. On the one hand, energy consumption and electricity demand in particular continues to increase manifold and, on the other hand, environmental problems like acid rain of carbon dioxide concentrations in the atmosphere, global warming, ground water contamination, thermal pollution etc. amongst other, provide momentum for strict restraints on the consumption of fossil fuels.

The emissions from NTPC stations are by and large within the norms stipulated by the various Environmental Acts and as per the standards laid down by the State/Central Pollution Control Boards for the relevant projects. For reduction of green house gas emission per unit of electricity generated and improvement of efficiency, the NTPC initiated "Greenhouse Gas Pollution Prevention Project" and established "Centre for Power Efficiency and Environmental Protection (CENPEEP)" in association with

United States Agency for International Development (USAID) at its NOIDA premises for implementation of measures for environmental protection.

NTPC adopted the comprehensive performance optimization program to achieve improvement in efficiency of electricity generation and thereby reducing the coal consumption per unit of electricity generated, with consequential reduction in emission of carbon dioxide and more productivity from same resources. NTPC has developed core competence in engineering, construction and operation of coal and gas based power stations and associated transmission lines/sub-stations.

Adoption of New Technology

NTPC has pioneered adoption of several state-of-art technologies into Indian power sector through successful design and implementation in NTPC power plants. A few important adoptions are as follows :

1. Merry-go-round system of transportation of coal from mine to power stations.
2. Combined cycle gas based power plant.
3. Multiflue chimney for flue gas emission.
4. DDCMIs based control of power plant operation.
5. Transmission of power through High Voltage Direct Current (HVDC) link.
6. Satellite imaging : Adoption of satellite image processing and softwares such as Geographic Information System (GIS), Easipace and Mapinfo.
7. Use of naphtha as alternate fuel in gas based power project.

New Technologies in NTPC :

NTPC is in the process of adopting the following new technologies :

Super Critical Technology : For the first time in India, NTPC has planned to induct super critical technology for its Sipat Project (3 x 660 MW) in Chattisgarh. This technology will result in improvement in thermal efficiency and also reduce emissions of greenhouse gases significantly. Flue gas conditioning to Reduce Stack Emission - To further reduce the stack emissions and improve the collection of EPSs, NTPC is adopting Flue Gas Conditioning (FGC) system for new project like Rihand-II (2x500 MW) as well as for retrofit of some operating plants. Integrated Gasification Combined Cycle - A study under USDOE/USAID funding has been initiated to conduct a techno-economic study for setting up a commercial scale demonstration power plant in India using Integrated Gasification combined cycle technology. These plants utilize low grade coals and have high efficiencies as compared to conventional plants.

Computer Application and Communication in NTPC

NTPC's Digital Communication Network today links 20 power stations/projects, three regional offices and Corporate Centre offices at Scope, New Delhi and Noida through Hybrid Satellite/Microwave links. Network expansion is underway through three additional VSAT stations at Sipat power project, NRHQ at Lucknow and Koldam hydro project.

Network communication working in Star topology is being upgraded to provide MESH connectivity to cover the communication

requirement for Availability Based Tariff and inter-regional plant level connectivity. Bandwidth is being upgraded to cater for the tender notices on Web and increased number of messaging users. Trunk Radio system is providing mobile connectivity operationalised at KSTPP and under implementation at RSTPP, FSTPP and KhSTPP.

On-Line Applications

On-line Application Systems cover Anurakshan (Maintenance Management) Finance & Materials areas made operational at 19 power stations. Operations Performance Parameters Monitoring System implemented at 10 thermal power stations, one regional headquarter and Corporate centre and under implementation at remaining stations/regional headquarters. Paryavaran Monitoring System (PMS) has been implemented at 15 power stations and Corporate centre. PMS provides effective and efficient information flow for improved monitoring and reporting system using GUI interface.

NTPC tender notices have started appearing on NTPC websites "ntpc.co.in and ntpctender.com" for increased transparency and visibility. Also common spares positions of identified items have been put on central database to facilitate information exchange and spare parts inventory optimisation.[14] Integrated commercial management system with reference to billing/revenue collection and monitoring at regional offices and at Corporate centre has been implemented at eastern, western, southern regions and at Corporate centre.

A massive Country-wide Awareness Campaign with the objective of highlighting the present problem and outlining the road map for reforms

to provide "Power for All by 2012" was launched by the Union Minister of Power. The organisation-wise breakup of districts covered and road shows conducted has been furnished in Table 3.6.

TABLE 3.6

Organisation, Districts Covered and No. of Road Shows

Organisation	Districts Covered	No. of Road Shows
NTPC	350	1374
POWERGRID	96	478
NHPC	79	127
PFC	28	84
NEEPCO	4	5
MoP/CEA	-	17
Total	557	2085

Source : GOI, NTPC, NTPC Profile, 2002, New Delhi.

Table 3.6 depicts that in all 2,085 road shows were conducted all over India till December 2001 in different districts and State capitals. NTPC covered highest districts and road shows i.e., 350 and 1,374 respectively.

Human Resource Assets

NTPC assesses its human resource assets using various accounting principles embedded in human resource accounting philosophy to treat them at par with other assets. Lev and Shwartz model of human resource accounting has been employed to assess the vlaue of human resources. During the year 2000-01, total number of employees in NTPC was 23,978 which comprises 7,945 executives, 2,779 supervisors and 13,254 workmen.

NTPC provides equal opportunity and congenial work environment to the women employees. There is a women cell in each unit/project to monitor harassment against women. During the year 2001-02 women constitute 1.86 per cent in executive cadre, 3.19 per cent in the supervisor cadre and 3.63 per cent in the workmen cadre.

Physically Handicapped Employees in NTPC

Recruitment made in respect of physically handicapped in NTPC under the administrative control of Ministry of Power is regularly monitored. Periodical returns, like half yearly returns, annual returns etc. are also sent to Ministry of Social Justice and Empowerment, Department of Personnel and Training and Department of Public Enterprises regularly. At present 0.62 per cent workmen, 0.41 per cent supervisors and 0.11 per cent executives are physically handicapped employees in NTPC.

Employee retention rates has been furnished in Table 3.7.

TABLE 3.7

EMPLOYEE RETENTION RATES

Year	Executive Manpower	Numbers Resigned	Retention %
1995-96	6914	160	97.69
1996-97	6960	116	98.33
1997-98	6933	89	98.72
1998-99	7250	77	98.94
1999-2K	7607	51	99.33
2000-01	7945	34	99.57

Sources Govt of India, NTPC, G P Award, 2002, New Delhi

Table 3.7 clearly reflects that the organisation has lived upto the expectations of its employees with an increase in the retention rate of 97.69 per cent in 1995-96 to 99.57 per cent in 2000-01 and a sharp decline in the number of employees resigning. This is an indication of job satisfaction with proper person at the proper place.

Ranking of the Organisation as an Employer

After a study of fourty public sector undertakings, NTPC was compared with them on thirteen dimensions, as shown in Table 3.8.

TABLE 3.8

COMPARISON WITH 40 PSEs

Sl. No.	Dimension	NTPC-Executive (Mean as %age)	40 PSEs Mean as %age
1.	Safety & Security	78	55
2.	Monetary Benefit	74	42
3.	Organisational Commitment	71	57
4.	Job Satisfaction	69	56
5.	Training & Education	65	64
6.	Job Contents	60	57
7.	Welfare Facilities	59	37
8.	Delegation of Authority	58	33
9.	Objectivity & Rationality	58	44
10.	Participative Management	57	41
11.	Recognition & Appreciation	53	45
12.	Grievance Handling	43	35
13.	Scope of Advancement	48	40

Source : Govt. of India, NTPC, G.P. Award, 2002, New Delhi.

Table 3.8 reveals that on all counts, NTPC is way ahead of its contemporaries, especially in providing safety and security, monetary benefits, job satisfaction, welfare facilities, delegation of authority. Its emphasis on organisational commitment and participative management can also be noticed from the table as in both cases NTPC is many points higher than the PSUs.

Man Days Lost

No man days were lost during the year 2001-02 on the following count :

i)	Strikes	:	Nil
ii)	Lock outs	:	Nil
	Total man-days available	:	71,67,628*

*Based on the number of employees multiplied by number of days in a year less 52 Sundays and 14 holidays (12 closed and 2 restricted).

This is a clear indication of a harmonious relationship between employer and employees at present existing in the NTPC.

Employee Appraisal System

To bring in a culture of target oriented performance and measuring the actual achievements, a revised performance management system for senior management including the full time Board members has been introduced. For the middle management, appraisal is based on evaluation of performance in key performance areas. Review is done every six months of targets for performance.

Human Resource Development

For NTPC, employees are its most valuable assets. Powered by its visionary leaders and committed work force of about 24,000, NTPC has a dynamic presence across the country. Effective human resource development has been at the core of the success of NTPC. Harmonious employees relations, participatory work culture, highly motivated employees, and effective human resource policies have all led to improve employee productivity. The company attaches great importance to training and development which is the key to developing human resource. The approach is two pronged, consisting of pre-employment and post-employment training schemes. NTPC has also created an organisational climate with the help of its participatory and value based work culture.

Social Policies of NTPC

NTPC has been a socially committed organization since inception. A comprehensive Resettlement & Rehabilitation (R & R) policy was formulated in 1991 and subsequently revised in May 1993 for implementation in respect of the existing and upcoming projects. R & R is treated in NTPC as a responsibility and commitment and not as a charity or welfare measure. The R & R policy has been framed with a clear objective that NTPC will take measures so that project affected persons are enumerated on the basis of loss of livelihood and not loss of land alone and on individual basis instead of family basis. The policy, therefore, is applicable to agricultural labourers, tribals, landless labourers cultivating government land, tenant tillers etc. There are total twelve categories of

PAPs. Depending on the category of PAPs, the rehabilitation options include :

1. Land for land
2. Self-employment such as dairy, poultry, handicraft etc.
3. Allotment of shops
4. Award of petty contracts
5. Jobs

Jobs are offered under exceptional circumstances only as the state-of-art technology used by NTPC in its plants has reduced employment options and leaves little room for deployment of unskilled labour.

The resettlement includes :

1. Provision of developed alternate free house plot in resettlement colony with necessary infrastructure facilities which include village roads, drainage, drinking water facilities, community halls, augmentation of primary health centres, primary schools, streetlights etc.
2. Transport arrangement for shifting of belongings and reusable material.

For establishing the base line data for each PAP and to enable the preparation of suitable Rehabilitation Action Plan (RAP), a detailed socio-economic survey is conducted through reputed institutions. For old projects, a retrofit socio-economic study is carried out through reputed institutions and a Remedial Action Plan (ReAP) is prepared. In addition the infrastructure facilities are created/augmented based on the finding of

survey. The RAP/ReAP is finalized in a consultative manner with PAPs. NTPC has been awarded CoRe-BCSD Corporate Social Responsibility Award in recognition of its leadership efforts towards social repsonsibility by Tata Energy Research Institute.[15]

Special Accomplishment

NTPC's pursuit for excellence with good system orientation, has seen Engineering Division, Operation Services Division, Contracts and Materials Division, Consultancy Wing, Corporate Commercial, Corporate HR and the Power Management Institute (PMI) achieving ISO-9001 certification. Seventeen out of twenty stations of NTPC have been accredited with ISO-9002 certification and eighteen out of twenty stations of NTPC have been accredited with ISO-14001 certification in the area of environment management system.

NTPC has been the recipient of various prestigious awards for its performance in various areas such as employees' commitment to achieving high standards of efficient handling of practical work situations at projects and plants, efficiency in operation and maintenance of power plants, achievements in maintaining high standards in the area of safety. A brief account of the awards received is as under :

Prime Minister's Shram awards every year since 1986. Prime Minister's Award for Excellence in Memorandum of Understanding (MoU) for the year 1998-99, 1999-00 and 2000-01 in succession for being one of the top ten performers in the country.[16] During the years 1999-2000 and 2000-01, NTPC was a top awardee. Six employees of NTPC Badarpur

bagged Vishwakarma Award. Wisitex Foundation conferred on the NTPC Chairman the "Man of Infrastructure" award in recognition of his significant contribution in the field of power. NTPC has bagged the prestigeous National Award, instituted by Indian Society for Training and Development, for the best practices for the year 2001-02. Shri C.P. Jain, Chairman and Managing Director, NTPC have been conferred with Distinguished Fellowship instituted by the Institute of Directors in association with World Environment Foundation of Excellence in Corporate Governance and Services to the power sector.

Corporation's CENPEEP has been selected for the 'Climate Technology Initiative Award' being given by the International Energy Agency.[17] This prestigious award will be presented to CENPEEP during the 8th Conference of the Parties of United Nations Framework Convention on Climate Change, to be held in New Delhi in October 2002. Golden Peacock Award was given to NTPC for Excellence in Corporate Governance-2002 by the World Council for Corporate Governance in association with the Centre for Corporate Governance and Institute of Directors.

NTPC's Ramagundam super thermal power station won the runners up Environmental Award from the Council of Power Utilities.[18] The award was received on the occasion of the ongoing thermal centenary celebrations among the 700 MW and above capacity coal based stations.

The Ministry of Labour, Govt. of India has been operating Prime Minister's Shram Award Scheme for the recognition of workmen on their achievement at the national level. NTPC workmen are winning Prime

Minister's Award for the last 16 years regularly. The awards are as under :

SHRAM RATNA (Rs. 2,00,000/- and SANAD)

Year	Project/Station	
1999	Singrauli	
2000	Korba	

SHRAM RATNA (Rs. 1,00,000/- and SANAD)

1988	Ramagundam	(RSTPS)
1990	Ramagundam	(RSTPS)
1991	Vindhyachal	(VSTPP)
1993	Anta GPP	(AnGPP)
1994	Vindhyachal	(VSTPP)
1995	Ramagundam	(RSTPS)
1996	Ramagundam	(RSTPS)
1997	Vindhyachal	(VSTPP)
1998	Kahalgaon	(KhSTPP)
2001	Rihand	(RhSTPP)

SHRAM VIR (Rs. 60,000/- and SANAD)

1986	Korba	(KSTPS)
1987	Singrauli (SSTPS) & Korba	(KSTPS)
1989	Singrauli	(SSTPS)
1992	Singrauli	(SSTPS)
1993	Rihand	(RhSTPP)
1994	Auraiya	(AuGPP)
1995	Vindhayachal	(VSTPP)
1996	Vindhayachal	(VSTPP)
1997	Vindhayachal	(VSTPP)

SHRAM SHRI (Rs. 40,000/- and SANAD)

1992	Rihand	(RhSTPP)
2001	Farakka	(FSTPP)

Five workmen from Rihand have won Shram Bhushan and four from Farakka have received Shram Shree Awards for the year 2001 under the prestigious Prime Minister's Shram Awards Scheme.

NTPC in a short span of time, has grown to become an industry leader in the country. It was established in 1975 with the task of setting up of Singrauli super thermal power station alone. But later on it emerged as a trend setter not only for NTPC power projects but for the nation as a whole. Besides its own stations NTPC also manages the Badarpur thermal power stations in Delhi and Balco's captive power station near Korba, Madhya Pradesh. It has pioneered the adoption of several new technologies in the power sector in the country. NTPC has also gained worldwide recognition and won several prestigious awards and accolades along the way. Today, among the ten best performing coal based power stations in the country, six belong to NTPC.

From the foregoing discussion it is borne out that the NTPC has done pioneering work in the area of power generation. By establishing a number of gas based and coal based power plants, the NTPC has brought about the much needed revolution in providing qualitative, regular and stable power to the various sectors of Indian economy. The Corporation role has tremendously contributed to the economic development of the country. Its praiseworthy performance has earned to the Corporation numerous national level awards year after year. All this has been possible because of the effective organisation structure of the NTPC which galvanized the men and material resources at this disposal of the Corporation into one entity dedicated to the achievement of Corporations cardinal objectives. The next chapter, accordingly, is devoted to a discussion on the organisation structure of the NTPC.

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CHAPTER - 4

Organizational Structure of N.T.P.C.

CHAPTER – 4

ORGANIZATIONAL STRUCTURE OF NTPC

The success of any organisation in the achievement of its goal predominantly depends upon the soundness of its organisation structure. The NTPC is no exception to it. The present chapter is devoted to a discussion on the organisation structure of the NTPC.

'Organisation' is viewed from different angles as a process of management. But all points of view converge to recognize the fact that 'organisation' is an important ingredient of management system without which the achievement of the goal of enterprise remains a dream unredeemed. Organisation is viewed as a structure and process by which a cooperative group of human beings allocated its tasks among its members, identified relationships and integrated its activities towards common objectives.[1] Organisation thus, is the process of identifying and grouping the work to be performed, defining and delegating responsibility, authority, and establishing relationship for the purpose of enabling people to work most effectively together in accomplishing the objectives.

Organisation is also considered as the framework of responsibilities, authority and duties through which all the resources of an enterprises are bought together and coordinated for the achievement of management objectives. In a similar way organisation as a process of determining what must be done if a given aim is to be achieved, dividing the necessary activities into segments small enough to be performed by one person, and providing means of coordination so that there is no wasted effort and the members of the organisation do not get in each other's way.[2]

Organisation helps in planning, staffing, directing and controlling. It is a backbone of management. Without efficient organization no management can perform its functions smoothly. Organisation as a function of management involves identification and grouping the activities to be performed and dividing them among the individuals and creating authority and responsibility relationship among them. Organisation is the mechanism through which management functions and controls the enterprise. It is really the foundation of management.

Organizational Structure :

Organizational structure refers to the ways that tasks and responsibilities are allocated to individuals and the ways that individuals are grouped together into offices, departments, and divisions. The structure, which is reflected in an organization chart, designates formal reporting relationships and defines the number of levels in the hierarchy.[3] Organization is not an end in itself, but a means to the end of business performance and business results. Organization structure is an indispensable means; and the wrong structure will seriously impair business performance and may even destroy it. Organization structure must be designed so as to make possible the attainment of the objective of the business for a number of years to come. Hence organizational structure is more than a series of inter-connected boxes and lines on a chart.[4] Organizational structure also comprises the formal communication network of the business through which decision and instructions flow downwards and reports flow upwards as feedback for managerial control.

Organisation structure has been playing a very important role where management of man and material resources for the achievement of a well defined goal is involved. Good management, therefore, always concentrates on organisation and directing the cooperative efforts of human beings so as to achieve the best possible results. The success and productivity of an organisation depends not only on its machines and technological advancement but also its effective management structure. A poor organizational structure will lead to the lack of confidence among the personnel, duplication of work, lack of coordination and ineffective delegation of authority thereby affecting adversely the organisation's efficiency and efficacy. A well defined management structural set-up will definitely avoid all these drawbacks and will improve efficiency.

Organizational Structure of NTPC

National Thermal Power Corporation works under the aegis of the Ministry of Power of the Government of India. The Ministry of Power exercises general administrative control over the NTPC. The Ministry participates in the decision-making process within the NTPC through its Joint Secretary who is nominated on the Board of the Corporation. The NTPC, being a Navratna Company, the composition of the Board of NTPC also includes four external Directors who are appointed to the Board through a Search Committee set up by the Government of India. The performance of the organisation, risks and concerns, opportunities and threats, developments in the industry and all sorts of plans and policies of the Corporation are shared with the Ministry of Power through Secretary level meetings held every quarter. Besides, various Parliamentary Committees,

namely the Consultative Committee on Power, the Standing Committee on Energy, Committee on Public Undertakings, Assurance Committee, etc. also review the functioning of the organisation. Till August 1982, the Corporation functioned with a two-tier structure i.e. Corporate Centre and Plants. Keeping in view the growth projections of the Corporation, a new three-tier structure consisting of Corporate Centre, Regional Headquarters and Plants was implemented. In the mid 1980, the Corporation was moving from being a project organisation to becoming an operating organisation. An organisation study conducted by IIM, Ahmedabad in 1989 recommended, among other things, transformation of the NTPC as a holding company, with regional companies as its subsidiaries. Later, an internal committee (Rajendra Singh Committee) re-examined the issue and adopted the basic themes of decentralisation and integration through the task force concept. The rapid response requirements and commercial compulsions of the coming decades call for such restructuring. A Corporate centre, retains only broad policy making and strategic long term planning functions, assumes responsibility for research and development and core engineering, maintains liaison with international bodies, conducts overall monitoring of NTPC's performance, and promotes overall development of NTPC's human resource and management systems.

Organisational structure of NTPC at the top consists of the Board of Directors, Chairman and Managing Directors, Directors in their specialisation field and Executive Directors.

Board of Directors

The NTPC is managed by the Board of Directors. The Board of Directors and chief executive officers are the primary groups involved with

Corporate level strategy making. The Board is legally mandated to control the organization and be centrally concerned with maintaining operations and effectiveness.[5] The Board of NTPC is responsible to plan, promote and organise integrated and sufficient development of thermal, hydel power and power through non-conventional, renewal energy sources in India or abroad. The Board is responsible for attaining the main objects as specified in the Memorandum of Association of the Company as per the provisions of the Companies Act, 1956.

Composition of the Board of Directors

As per Articles of Association of NTPC

Maximum number of Directors = 15

Minimum number of Directors = 04

The President of India determines the number of Directors of the Company within the span of atleast four and at the most fifteen. These Directors may be either whole time functional Directors or part-time Directors provided that the number of part-time Directors, other than those from government and subsidiary companies, should not exceed one-third of the total members of the Board.

Appointment of Board of Directors

The organizational structure of NTPC is headed by a Chairman and Managing Director. The Chairman is appointed by the President. Also, all other members of the Board including the Vice-Chairman, are appointed by the President in consultation with the Chairman of the Corporation. No such consultation is necessary in case of appointment of Directors representing

the government. The President has the right to fill any vacancy in the office of the Directors caused by removal, resignation, death or otherwise.

Alternate Director

As per the provisions of Articles of Association of NTPC "in place of a Director who is out of India or is about to go out of India or who expects to be absent for not less than three months from the State in which meetings of the Directors are ordinarily held, the President may appoint, in consultation with the Chairman of the Company, any person to be an alternate Director during his absence out of India or his absence of not less than three months from the State in which the meetings of the Board are ordinarily held and such appointee, whilst he holds office as an alternate Director, shall be entitled to notice of meetings of the Board and to attend and to vote threat accordingly".[6]

Powers of the Board :

Composition, appointment, removal and power of the Board of Directors of NTPC are regulated by its Articles of Association. General Powers of the Board are mentioned in Article 28 and specific powers of the Board are contained in Article 55.[7] The matters, which are outside the powers of the Board require approval of the President of India. They are dealt with in Article 44.

General Powers of the Board

According to Article of Association the general powers of the Board are as follows :

* The business of the company shall be managed by the Board of Directors.

* The Board may, subject to the provisions of Section 292 of the Act, delegate any of their powers to Committees consisting of such member or members of their body as they think fit and they may from time to time revoke such delegation.

* The Directors shall from time to time determine whether and to what extent and at what time and places and under what conditions or regulations the account and books of the company or any of them shall be open to the inspection of members not being Directors and no member (not being a Director) shall have any right of inspecting any account or book or document of the company except as conferred by law or authorised by the Board or by the company in General Meeting.

* The Board of Directors may from time to time, make calls upon the members or debenture-holders in respect of any moneys unpaid on their shares or debentures and specify the time or times of payments.

* Subject to the provisions of Section 58A, 292 and 293 of the Act; and government guidelines issued from time to time, the Board may by means of resolution passed at meetings of the Board from time to time, accept deposits or borrow and/or secure the payment of any sum or sums of money for the purpose of the Company.

Specific Powers of Directors

Specific powers of Directors are as follows :

* To make bye-laws.

* To pay and charge interest etc.
* To acquire property.
* To pay for property in debentures.
* To ensure contracts by mortgage.
* To refer to arbitration.
* To invest money.
* To give bonus.
* To subscribe to other funds.
* To create depreciation and other funds.
* To create posts.
* To appoint officers.
* Authority to sub-delegate power.
* To lend money.
* Formation of joint venture/subsidiary companies.

Matters Reserved for President

Decisions in respect of the following matters related to the NTPC are reserved for the President of India :

* The Company's revenue budget in case there is an element of deficit which is proposed to be met by obtaining funds from the government.
* Winding up of the Company.
* Sale, lease, disposal or otherwise of the whole or substantially the whole of the undertaking of the Company.
* The Annual and Five Year Plans for Development.

* Any other matter which in the opinion of the Chairman and Managing Director be of such importance as to be reserved for the approval of the President.

NTPC is a Public Sector Corporation. The remuneration of all the members of the Board of Directors, including the Chairman and Managing Director, is fixed by the President of India. Whole time Directors and the Chairman and Managing Director are selected on the recommendation of the Public Enterprise Selection Board. Four non-official part-time Directors are selected by the Search Committee and these directors are chosen from among such persons who have impeccable stature and background. The criterion for selection of the Board is not disclosed in the annual report.

The Board of Directors have authority to create posts, other than those to which appointment is made by the President, as they may consider necessary for the efficient conduct of the Company's affairs and to determine the scale of pay and other term thereof. The Board also has power to appoint and, at their discretion, remove or suspend such managers, secretaries, officers, clerks, agents and servants from permanent, temporary or special services, as they may from time to time, deem fit; to determine their powers and duties and fix their salaries or emoluments and require security in such instances and to such amounts as they may think fit; and also without prejudice as aforesaid from time to time provide for the management and transaction of the affairs of the Company in any specified locality in India in such manner as they think fit.

Size of the Board

At present, the Board comprises the Chairman and Managing Director and six whole time Directors in different functional areas besides two part time Officials and four non-official Directors. The present composition of the Board is as under :

Chairman and Managing Director (CMD)

Functional Directors

Director (Technical)	1	
Director (Projects)	1	
Director (Finance)	1	
Director (Operations)	1	
Director (Human Resources)	1	
Director (Commercial)	1	
Total (including CMD)		7
Part-time Official Directors (Govt. nominee)		
Joint Secretary & Financial Advisor, Ministry of Power	1	
Joint Secretary (Thermal), Ministry of Power	1	
Part-time Non-official Director	4	
Total		6
Grand Total		**13**

Every director keeps the company informed about the committee position he occupies in other companies and notifies changes as and when they take place. Besides the Executive Chairman and Managing Director, the company has six (6) posts of Executive Directors on the Board in the

field of Operations, Human Resources, Projects, Finance, Technical and Commercial. As per Navratna Guidelines, four independent Directors (Non-official part-time Directors) are on the Board of NTPC. They constitute about 30.76 per cent of the Board membership.

The Board enjoys a corporate status. The Government has delegated certain additional power to the Board. The Board delegate its power to the individual and functional members and their decision are deemed to be those of the Board. In accordance with the provisions of Section 292-A of the Companies Act 1956, the Board has re-constituted the Audit Sub-committee of the Board. The Audit Committee now comprises the following members :

i) Director (Project) or Director (Operations) of NTPC.

ii) Joint Secretary & Financial Advisor, Ministry of Power.

iii) One part-time non-official Director or part-time Director in the absence of non-official part-time Director to be nominated by the Board.

Director (Finance), Head of Internal Audit and Statutory Auditors are also invited in the Audit Committee Meetings.

With a view to reviewing the Management Control system, significant deviations in project implementation, and construction, operation and maintenance budgets, the Board has also constituted a Committee on Management Controls with the following members :

1. Director (Operations)
2. Director (Finance)
3. Joint Secretary and Financial Advisor, Minsitry of Power, and

4. One part-time non-official Director or part-time Director in the absence of non-official part-time Director to be nominated by the Board.

Under Section 217(2AA) of the Companies Act, 1956 Directors confirm that :

i) In the preparation of the annual accounts, the applicable accounting standards had been followed along with proper explanation relating to material departures;

ii) The Directors had selected such accounting policies and applied them consistently and made judgements and estimates that are reasonable and prudent so as to give a true and fair view of the state of affairs of the company as at the end of 31st March, 2001 and of the profit of the Company for the year ended on that date;

iii) The Directors had taken proper and sufficient care for the maintenance of adequate accounting records in accordance with the provisions of the Companies Act, 1956, for safeguarding the assets of the Company and for preventing and detecting the fraud and other irregularities and

iv) The Directors had prepared the annual accounts on a going concern basis.

The Directors are given exposure to the latest developments in management practices and technology through Senior Executive Development Programmes conducted by reputed institutions in India and abroad. They also keep themselves abreast with the latest developments through participation in various conferences and conventions.

Remuneration

The remuneration of the Directors is fixed by the Government of India. As far as the remuneration of the employees are concerned the same is fixed by the Board in accordance with the DPE guidelines. The part time non-official Directors are paid sitting fees for attending Board/Committee meetings as per the provision of the Act. Particulars of employees whose remuneration exceeds the prescribed limit are disclosed in the annual report of the Company. The remuneration paid to whole time Directors and Chairman and Managing Director comprises salaries and allowances. Appendix-IV.

Tenure of the Board Member

The whole time Directors including Chairman and Managing Director are appointed for a period of five years or till the date of superannuation, whichever is earlier. On the expiry of five years, their term is extended based on their performance for a period of five years or till the date of superannuation, whichever is earlier. Official Directors representing Government of India retire on ceasing to be officials of that Ministry. And non-official part-time Directors are appointed for a period of three years. The service of the Directors and employees of NTPC can be terminated by giving three months notice on either side.

Liability of Directors

The Directors of NTPC do not have a personal liability related to the functioning of the company. Directors are indemnified by the Company against any liability incurred by them in defending any proceedings, whether

civil or criminal, where judgment is not given in his favour or he is acquitted.

Corporate Governance Committee

Securities of NTPC are not listed on any Stock Exchange, as such the provisions of Corporate Governance Code as prescribed by Securities Exchange Board of India are not applicable to NTPC. As a measure towards better corporate governance, the Company has constituted a committee of the Board, called Committee on Management Controls. This Committee has a wide scope, which goes beyond statutory requirements, covering all aspects of construction and operational activities. The scope of activity and authority of this Committee, as decided by the Board of Directors, is given below :

* Review of management control systems and suggestions for improvement of the same.
* Focus on significant deviations from standard performance parameters.
* Check deviations in project implementation.
* Review of observations of Comptroller and Auditor-General (C & AG) including status of Government Audit paras.
* Review of Internal Audit paras outstanding for more than two years.
* Investigation on such matters, excluding those that fall under Section 292A, as may be referred to it by the Board from time to time.
* Any other matter referred to it by the Board of Directors.

Interactive meetings are held with the statutory auditors to review the internal control systems and the annual accounts. The Committee has also undertaken review of the internal control systems from the point of view of their adequacy. The existing management systems are also under review of the committee for bringing in greater efficiencies. This Committee is in fact functioning like a Corporate Governance Committee. Hence, it is being re-christened as Corporate Governance Committee. The minutes of such Committee are placed on the Board.

The second tier consists of five regional set-ups namely North, East, West, South and National Capital Region with their headquarters at Allahabad, Nagpur, Patna, Hyderabad and Delhi respectively headed by Executive Directors who are accountable for the operations and project execution activities in their respective regions to the Chairman and Managing Director.

The regional offices are responsible for the construction, commissioning and operation of generating units and are associated with transmission network. The project team working at sites are headed by General Managers who report to their respective Executive Directors in the region. These Executive Directors report directly to the Chief Executive at the Corporate Centre of their activities. Regional offices are the growth centres with responsibilities including growth of business opportunities and follow up with customers for revenue. The projects of NTPC are the operational units directly responsible for generation of power.

Employees' Participation in Management

Employees' Participation in Management has been one of the strong pillars holding up NTPC since its inception. NTPC has twenty stations in its fold today and the participation of around 24,000 employees in the management process takes place at, mainly, three levels, viz. Project/Station level, Regional level, and Corporate level. Each project has an apex-body, namely Plant Level Council (PLCs) and a number of (usually 4-5) Shop/ Department Level Councils (SLCs). Besides PLC/SLCs, various joint committees are formed to deal with aspects such as safety, township, sports, recreation etc.

Plant Level Council (PLC)

Plant Level Council is an apex level bipartite forum formed at the plant level which is chaired by the Head of Project. It is constituted to discuss plant level issues information sharing on generation and production targets, productivity, elimination of wasteful practices, inventory reduction, general health, welfare and safety, and any other issue referred to it by shop councils. Members of PLC include - Head of the Project as the Chairman, three members representing the management, and three members representing employees. These Members are nominated by the respective unions/associations for one year. An executive of the Personnel & Administration Department serves as the Secretary of the Council. The forum meets once in every quarter of the year.

Shop Level Council (SLC)

Bipartite forum at the Department/Shop level is chaired by the Head of Department. The number of SLCs is usually 4-5 depending upon the

major areas that constitute separate identifiable groups functionally covering areas such as, Operation, Maintenance, Fuel Management, Services (Personnel, Finance, EDP) and Civil. SLCs are constituted to discuss department level issues such as improvement of production, productivity and efficiency, elimination of wastage, improvement in working conditions, safety, etc. Members included in Shop Level Council are Head of Department as the Chairman and 8-12 members equally representing the management and employees. Members to this forum are nominated by the respective unions/associations for one year. An executive of the Personnel and Administration Department would be the Secretary. This forum meets once every month.

Besides these, there are various joint committees constituted at the project level, represented equally by management and employees, to take care of issues related to employee welfare. The important joint committees are Canteen Management Committee, House Allotment Committee, Township Advisory Committee, Plant Safety Committee and Sports Council.

Regional Level

NTPC projects are located within five regions - Eastern, Northern, Western, Southern, and National Capital Region, each headed by an Executive Director. The Executive Director of a region enjoys wide powers to deal with issues concerning that particular region. Meetings are held every quarter with unions and associations of employees of a particular region to discuss and deal with various issues.

At the Corporate level there are separate participative forum for workmen, supervisors and executives.

National Bipartite Committee (NBC)

This apex negotiating forum comprises of management representatives and workmen representatives drawn from coal-based thermal power stations which have a workmen strength of over 500 and have at least one unit commissioned. Besides workmen representatives from project unions, Central Leaders (one each) from four national trade unions - INTUC, BMS, AITUC and CITU - are part of the committee. The forum meets at least 2-3 times a year or even more frequently, if required. Issues discussed are related to wages and employees welfare.

Supervisory Employees' Joint Committee (SEJC)

The apex joint forum comprises of management representatives and representatives of supervisors drawn from coal-based thermal projects, which have at least one unit, commissioned. This is a consultative forum where information, ideas and concerns are shared. The forum meets at least twice a year. Issues discussed are related to the welfare of the supervisors' community.

NTPC Executives' Federation of India (NEFI)

It is a federation of all the Executive Associations from various projects of NTPC, with which the management interacts to share information, ideas and concerns of the executive community. The forum meets at least twice a year. Issues discussed are related to the welfare of the executives' community.

The three apex forum mentioned above basically deal with issues related to employee wages and welfare, while the NTPC Joint Performance

Committee, Supervisory Employees' Joint Committee and NTPC Executives' Federation of India forums, which meet twice a year, deal with matters relating to productivity, cost-reduction, improvements in working conditions, safety etc.

All Industrial relations issues are resolved through structured Bi-partite forums. The following number of Staff Forums are in existence as on date (2002) :

1. Number of Trade Unions - 84
2. Number of Supervisory Associations - 12
3. Number of Executive Associations - 16

Management - Unions/Associations Relations

Project/Station level : Regular formal and informal interactions take place, to communicate with employees through their respective representatives at the level of Head of Project and Head of Departments. Management and Employee concerns, not involving policy changes, are discussed and sorted out at the unit level.

Regional level : The Executive Director of the region enjoys wide powers to deal with issues concerning that particular region. Meetings are held every quarter with unions and associations of employees of a particular region to discuss and deal with various issues.

NTPC's growth in terms of number of employees over the last decade of nineties has been furnished in Table 4.1.

TABLE 4.1

NTPC'S MANPOWER STATUS

Year	Executives	Supervisors	Workmen	Total
1990-91	6717	3202	12133	22052
1991-92	6401	3021	12076	21498
1992-93	6499	3040	12258	21797
1993-94	6604	3005	12318	21927
1994-95	6841	3010	12445	22296
1995-96	6914	2951	14414	24279
1996-97	7014	2951	14429	24394
1997-98	6933	3074	13578	23585
1998-99	7248	3059	13323	23630
1999-00	7607	2893	13524	24024
2000-01	7945	2779	13254	23978

Source : Compiled from various Annual Reports of NTPC.

Table 4.1 shows the growth in manpower status of NTPC. The strength behind any organisation is its dedicated workforce. Growth of organisation can be estimated by the growth of its employees. Number of executives in the year 1990-91 was 6,717, whereas there were 3,202 supervisor and 12,133 workmen, making a workforce of 22,052. In the subsequent year the total number of workers decreased to 21,498 in 1991-92. The strength of workforce has been on constant increase in the years 1992-93 and onward indicating an upsurge in the activities and size of NTPC. Though the increase in staff strength was at a slow pace till 1994-95 but in 1995-96 and 1996-97 the total workforce made rapid strides and was at 24,394 workers at the end of 1996-97. This tremendous increase in

workforce came about due to the takeover by NTPC of Talcher thermal power station from Orissa State Electricity Board alongwith its workmen numbering 1,989. The strength of worker fell subsequently and in 1997-98 the number of employees got reduced to 23,585, a decrease of 809 workmen. It again started increasing till 1999-2000. This increase was due to the capacity addition. But in 2000-01 it came down to 23,978, a reduction of 46 workmen (including executives, supervisor and workmen).

From 1991 to 2001 inspite of capacity addition only 1,843 more employees have been recruited by the NTPC. During the last 5 years there has been no significant increase in manpower despite capacity addition. The reason seems to be the impact of the policy of downsizing the establishment being pursued by the Government during the last few years.

Table 4.2 throws light on the regionwise distribution of manpower status of the NTPC.

TABLE 4.2

REGIONWISE MANPOWER STATUS OF NTPC

Project/Location	Executives	In-position Supervisors	Workmen	Total
Northern Region				
Northern Region Hqtr.	55	15	27	97
Singrauli	492	313	1210	2015
Rihand	329	94	540	963
Unchahar	372	130	685	1187
Tanda	158	2	401	561
TOTAL	**1406**	**554**	**2863**	**4823**
Western Region				
Western Region Hqtr.	74	9	11	94
Korba	479	303	1284	2066

Contd....

Vindhyachal	600	198	1001	1799
Balco	132	48	247	427
Sipat	50	2	7	59
Kawas	114	21	156	291
Jhanor Gandhar	108	21	82	211
TOTAL	**1557**	**602**	**2788**	**4947**
Southern Region				
Southern Region Hqtr.	107	13	53	173
Ramagundam	475	239	1103	1817
Simhadri	231	35	49	315
Kayamkulam	89	18	43	150
TOTAL	**902**	**305**	**1248**	**2455**
Eastern Region				
Eastern Region Hqtr.	96	19	41	156
Farakka	504	195	1112	1811
Kahalgaon	389	157	615	1161
Talcher Kaniha	352	92	340	784
Talcher Thermal	204	35	1198	1437
TOTAL	**1545**	**498**	**3306**	**5349**
National Cap. Region				
National Cap. Region Hqtr.	85	12	25	122
Badarpur	365	321	1576	2262
National Capital	454	149	583	1186
Dadri Gas	40	5	57	102
Anta	91	14	134	239
Auraiya	98	19	152	269
Faridabad	109	13	32	154
Koldam	38	3	5	46
Corporate Centre	1255	284	485	2024
TOTAL	**2535**	**820**	**3049**	**6404**
GRAND TOTAL	**7945**	**2779**	**13254**	**23978**
Excl. Badarpur/Balco	7448	2410	11431	21289

Source . Annual Report of NTPC 2000-2001, p. 130.

Table 4.2 depicts the projectwise strength of executives, supervisors and workmen in different regions under the umbrella of NTPC as on 31.3.2001. It will be observed for the data that the national capital region has the largest strength of workers. The workforce in this region stands at

6,404 workers who look after as many as nine projects under this region. Eastern region follows it with a staff strength of 5,349 workers serving in five projects under this region. The other regions more or less are at par with each other in respect of strength of workforce and the number of plants within their respective territories.

Recruitment of Executives

The Executives in NTPC are recruited through a selection board comprising external experts on the basis of their response to the open advertisement inserted in major dailies of the country. Executives have professional qualifications like Bachelor of Engineering (BE)/Bachelor of Technology (B.Tech.)/Master of Technology (M.Tech.) in various disciplines like Mechanical, Electrical, Civil, Electronics and IT and MBA/ CA/ICWA. The executive trainees are recruited through an all India selection test. The Non-executives are recruited through the local employment exchange. Non-executive manpower comprises of both skilled and unskilled categories. Skilled manpower possesses qualifications like Diploma in Engg./NCTVT/ITI. The unskilled manpower is recruited mainly from amongst the land oustees at the project sites and they are required to have studied at least upto VIIIth class.

Power Management Institute

Power management is an integrated training institute, strives to enhance executive effectiveness and widen the knowledge horizon of managerial personnel. An ultra modern campus has been set up at Noida with the assistance of the World Bank. The aim of Power Management

Institute is to become an Institute of Excellence. PMI is serving the developmental needs of managers in power sector, both of the corporation as well as of other organisations. Some of the major initiatives of Power Management Institute are "Partners in Progress" pilot programme for State Electricity Boards, induction level training for reputed organization and best practices compilation. During the year 2001-02, Power Management Institute conducted 236 programmes covering around 5,500 delegates, including 850 external delegates.

The Power Management Institute is the Apex Training Institute. During the year 2000-2001 this Apex Training Institute conducted 218 training programmes covering a total number of 4,565 participants. Also 200 executive trainees in 2000 batch in the disciplines of personnel, finance and engineering were inducted during the year. Power Management Institute conducts long duration training programmes for young professionals in the field of engineering, finance and personnel for power utilities and other core public and private sector undertakings depending upon their requirements. The main objectives of these programmes are :

* To equip the trainees with knowledge and skills necessary to undertake a specific appointment immediately after training.
* To provide a wider understanding of the principles and practice of thermal power generation with related input of managerial techniques.
* To impart to the trainees in the area of personnel and finance formal training in various areas of management interspersed with rotational on the job training in various functions in personnel and finance followed by dclass room training.

* To develop a sense of involvement and unfaltered loyalty to the organisation.

* To provide opportunity and environment for self expression and development.[8]

Administrative hierarchy in NTPC

At present, in the administrative hierarchy of the NTPC, Chairman is the head of the Board and after the Chairman and Managing Director the Board is the highest body to look after the projects as well as the technical, financial, operational and commercial aspects of the NTPC. However, unlike most of the Public Undertaking where the Board of Directors is the supreme administrative authority, in the NTPC the Minister is the supreme authority and takes all important decisions. The Board only interprets these decisions and implement them. Thus the Board acts on the line prescribed by the Ministry of Power. The present NTPC Board has a similar status and comes only next in the administration. It is the Minister who formulates all policies and decides all matters. The technical policies which are formulated by the Board are in fact subpolicies which aim at facilitating the execution of main policies formulated by the Minister. Thus the NTPC Board does not function as a policy-making Board but as a policy implementation body.

The three tier structure of NTPC provides decentralisation of the responsibility while retaining centralised systems in areas such as engineering, contracting of high value packages, coordination with financing agencies etc. The main problems in organisational structure are as follows.

Tall hierarchy emerging from the three tier structure of NTPC poses great difficulty in controlling and directing. It also affects decision making because the decisions take too much time. Decentralisation of line functions has created problem of coordination because authority lies dispersed widely throughout the organisation under such set up. There is serious problems of communication gaps between the corporate management and operating units - in understanding corporate goals and policy guidelines and in designing performance reports. Tall structure also increases administrative distance between the top level and the lower level. Management find it difficult as the cost of maintaining the autonomous operating units is quite high.

Role ambiguity has started creeping in - since the respective roles of the employees are not clearly defined and jurisdiction of authority and scope of responsibility are not properly charted, it has led to role ambiguity which creates a confused situation. Sometimes individuals are forced into performing roles without adequate preparation for them. It is suggested that authority, responsibility and role of employee should be clearly defined for improving the efficiency.

Top management is free from the routine operating responsibilities in most of the areas but Executive Directors are overloaded with different kinds of work and they do not find time to supervise and guide the works of subordinates at lower level which results in duplication of work, less generation, and confusion among the employees. Since supervision is very important for increasing the efficiency of the organisation, it is suggested that workload of Executive Director should be reduced.

The major problem in NTPC is that too many persons vie each other to take credit for successes and too few are prepared to be accountable for failures. This may put blinkers in the managers' perceptions as they become insulated from the environment and instead of trying innovative approaches, they may stick to what has worked in the past. This may tend to maintain status quo which is a situation in which the growth stagnates and the inefficiency creep in. There should be timely and correct identification of such conditions. Innovation and creativeness both are imperative to improve the efficiency.

Personnel and Administration Department

The Personnel and Administration functions in NTPC have been of prime importance since its inception. Their tactful handling has contributed tremendously in the all-round development of its human resources. The nomenclature of Personnel and Administration Department however underwent a change in the year 2001. Accordingly, Personnel and Administration Department in the NTPC has been renamed as Human Resources Department and the designation of the functional Director has also been changed from Director (Personnel) to Director (Human Resources).

In NTPC the Human Resource Department is functioning in three tiers, viz. Corporate Centre, which is an apex body; secondly, the Regional Headquarters offices; and thirdly, the Projects/Station level. The Chief Controlling authority of the department is the Director of Human Resource and, at the Regional level, the Executive Director while General Manager is

the chief at the project level. The main functions of Human Resource Department are all personnel matters including Employee relation, Human Resource Policy, Compensation, Employee Welfare, Pension, Recruitment, Promotion, Project Employee Benefits and Employee Services. The main role of the Human Resource Department is to advise, guide, and serve in matters connected with Human Resource Management, e.g., methods of improving the use of manpower and reducing labour turnover, etc.

The Human Resource Department is sub-divided into a number of specialised departments. The various sub-departments of Human Resource Department in NTPC are as follows :

1. Employee Relation Department
2. Employee Benefit Department.
3. Employee Development Department
4. Employee Services Department, and
5. Employee Development Centre

The objective of Employee Relation Department is to maintain cordial relations between employer and employees based on mutual respect, trust, fair play and good faith. The success or failure of the organisation largely depends upon employees relation, viz. industrial relation in that organisation. Coordial and healthy relationship between the employer and employees in an undertaking plays an important role in ensuring industrial peace and increasing productivity and efficiency of workers in the organisation. This is possible when the management and the work force

interact in a spirit of mutual trust, and confidence and without causing friction.

It is necessary that employer should always adopt a welfare attitude towards its employees and should make provisions in existing set-up for grant of reasonable facilities for workers. The workers should also possess positive attitude towards the objectives of the organisation. Solicitude for workers welfare would directly increase the efficiency of the NTPC. This aspect is looked after by the Employee Benefit Department.

The objective of Employee Development Department is to focus on the development aspects of employees by looking after their training and developmental needs, career growth needs, motivation and moral needs, etc. Training enables an individual to do a job in a correct, effective and efficient manner. Therefore, it is also regarded as the corner-stone of sound human resource management. Employees must be systematically and scientifically trained to handle the job. Training has always been a key result area for a dynamic and growing organisation. The trained workforce infuses efficiency in work, innovation in approach and new ideas for the growth and development of the organisation.

NTPC is equipped with trained and competent manpower today. Its foundation is strong enough to withstand the accelerated pace of exploration and exploitation of resources. The changing technology demand a much higher number to be re-oriented towards modern techniques. Training institute should be well-equipped with the latest technology and manpower should be sent to foreign countries for training and development to

overcome the inadequacy of manpower resources. Therefore, there is urgent need to improve the generation, transmission and plant load factor etc.

Moreover a great drawback of training institutions is that some times it happens that the officers are appointed as teacher or lecturers in the training institutions without any attempt at finding out the suitability of such officers for the teaching profession. An officer may or may not have the capacity to teach. Teaching is an art which requires a lot of experience specially in the teaching field. Hence, there should be a positive selection process for the appointment of a teacher or lecturer in the training institute.

Promotion is an important function of Human Resource Management in NTPC. The employees are given promotion when and where necessary to increase the morale and to reduce the grievances of employee and to ensure overall increase the efficiency of the NTPC working. The promotion programme also have some defects. The present promotion scheme from the senior scale to the junior administrative grade gives much weightage to the confidential report. Sometimes it happens that the officers who prepare this report, do not like an employee for personal reasons although he is competent, hard working and has the ability to face the situation with confidence. But the confidential report does not favour him so that this leads to frustration in his career and this affects the overall morale of the organisation. The confidential report should not be the only determining factor of promotion but the authority should follow a procedure where merit would be the determining factor of promotion.

In NTPC, except in a few cases promotion is based on seniority. Although seniority may be a reasonable criterion, it alone should not be relied upon. Merit too has its claims. Both seniority and merit should form the basis of a promotion policy. Here it is suggested that both the criteria should be kept in mind while making promotions. When there are two employees of equal seniority, merit should be the deciding factor in a promotion policy. Where there are two employees of almost equal competency, seniority should be the decisive factor. Such a policy would satisfy both the management which prefers ability or merit and also the trade union which prefers seniority. It will also give satisfaction to the employees.

The objective of Employee Service Department is to spell out the service orientation of the function whereas the objective of Employee Development Centre is to focus on all-round development of employees through various learning methodologies. Human Resource Department also deals with employee-pay-system for fixing and adjusting rates of pay, and salary administration procedures. It also provides for sufficient social and financial security to staff of NTPC after retirement i.e., pension, provident fund and gratuity.

In brief, NTPC is managed and organised by the Board of Director under overall supervision of Ministry of Power. The board consists of the Chairman and Managing Director and six whole time Directors in different functional areas besides two part time officials and four non official Directors. Whole time Directors are responsible for giving necessary guidance to the lower authorities of the NTPC administration in respect of the subject under their charge. The Board has a joint Secretary.

Director (Human Resource) is the chief controlling authority of the Human Resource Department. This department deals all personnel matters including, Employee Relation, Human Resource Policy, Promotion, Employee Welfare, Pension, Recruitment, Project Employee Benefits and Employee Services etc.

The foregoing discussion provided an insight into the organisation structure of the NTPC. It comes to light that the Corporation has a sound and effective organisational network which has contributed in a significant measure to the success of the NTPC. The people at the helm of the organisation have been able to galvanize the workers into one group of people who pooled their efforts through functional division of duties, responsibility and authority for the attainment of Corporation's noble objectives of establishing plants for generating electric power for the country. The Corporation has been able to revolutionise the power sector of India and has succeeded in a grand manner to generate electric power and transmit it to various sectors of the economy in adequate measure. The NTPC has thus been a catalyst of economic development of the country through its role in the power sector. It has operated successfully since its inception in 1975. Its working and contribution over the course of more than a quarter century of its establishment needs a review. The next chapter is accordingly devoted to the study of working of NTPC thus far.

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CHAPTER - 5

Working of N.T.P.C.

CHAPTER – 5

WORKING OF NTPC

The discussion in the previous chapter genned up that the Government of India incorporated the National Thermal Power Corporation as a Public Sector Undertaking. The entire equity of NTPC is held by the Government of India and its nominee, which makes Government of India the only shareholder of the company. The company works under the aegis of the Ministry of Power of the Government of India. It is engaged in the production of electricity - a vital input for sustenance and growth of modern economy. Associated with the generation of electricity, NTPC's objectives include construction, operation and maintenance of super thermal power stations and laying the transmission lines from the generation plants to the consumption point. Since its inception in 1975, NTPC has now operated for over a quarter of a century. It has gone a long way in its activities and has worked rigorously to cope with the demand for power that continuously grew by leaps and bounds during the period of its existence. The present chapter is devoted to a review of the working of NTPC.

Growth in Power Generation :

The present generation capacity of NTPC is 20,249 MW consisting of 13 coal-based stations and seven gas/liquid fuel based stations and three joint venture projects. NTPC has been ranked sixth largest organisation in thermal power generation amongst the world's thermal generating companies and the second in term of capacity as per the bench-marking data of 200 top utilities of the world published by Marketline International, U.K.

NTPC accounted for well over one fourth of the entire electricity generated in the country during 2000-01 despite having less than one fifth of the country's total installed generation capacity. Seven NTPC coal stations figure among the best fifteen power stations of the country.[1] NTPC's gas-based and thermal power stations generated 130154 MUs only while gas-based stations generated 24922.5 MUs during 2000-01 as against 22745.9 MUs in the previous year, registering an increase of 9.57 per cent. This hike in generation has been mainly due to liquid fuel firing at some stations as also due to capacity addition at Faridabad station. Table 5.1 shows the power generation in million units of NTPC since 1990-91 to 2000-01.

TABLE 5.1

POWER GENERATION OF NTPC

(in Million Units)

Year	Power Generation
1990-91	46879
1991-92	61382
1992-93	66092
1993-94	76474
1994-95	76470
1995-96	89838
1996-97	97609
1997-98	106290
1998-99	109450
1999-00	118676
2000-01	130154

Source : Annual Reports of NTPC, Govt. of India, New Delhi.

Table 5.1 depicts the power generation in million units by NTPC between 1990-91 and 2000-01. The data reveals that the NTPC played a catalystic role in enhancing the power generation in the country. The electric energy production under the NTPC increased from 46879 MU in 1990-91 to 130154 MU in 2000-01, representing an overall increase of nearly 177.6 per cent or more than two times during the years under review. Moreover, the rate of increase is consistent during the years of the decade of nineties.

As India's reputed Public Sector Undertaking, NTPC received Govt. of India's numerous Meritorious Productivity Award for its working performance as represented by the figure in table 5.1 above. This pride performance of NTPC is despite the many handicap NTPC faced during the period its working. The NTPC suffered from inadequate coal supply, Oil supply etc. Lack of supply of fuel affected the operational performance of the units. Coal is the vital input in thermal energy. NTPC is the single largest consumer of coal in the power sector. The coal reserves are located far away from load centres. Railway is the main source of transportation of the coal. Transportation outstanding dues against NTPC of the Indian railway create problems in power generation. According to the Power Ministry's estimates, the outstanding freight charges owned by the SEBs to the Indian Railways for coal transportation have reached Rs. 22 billion with NTPC's Badarpur thermal station topping the list of defaulters with Rs. 9.46 billion.[2]

India has abundant reserves of coal but Indian Coal is low grade coal. Yet the demand of coal is very high but supply is not sufficient. This gap between demand and supply creates problem in power generation.

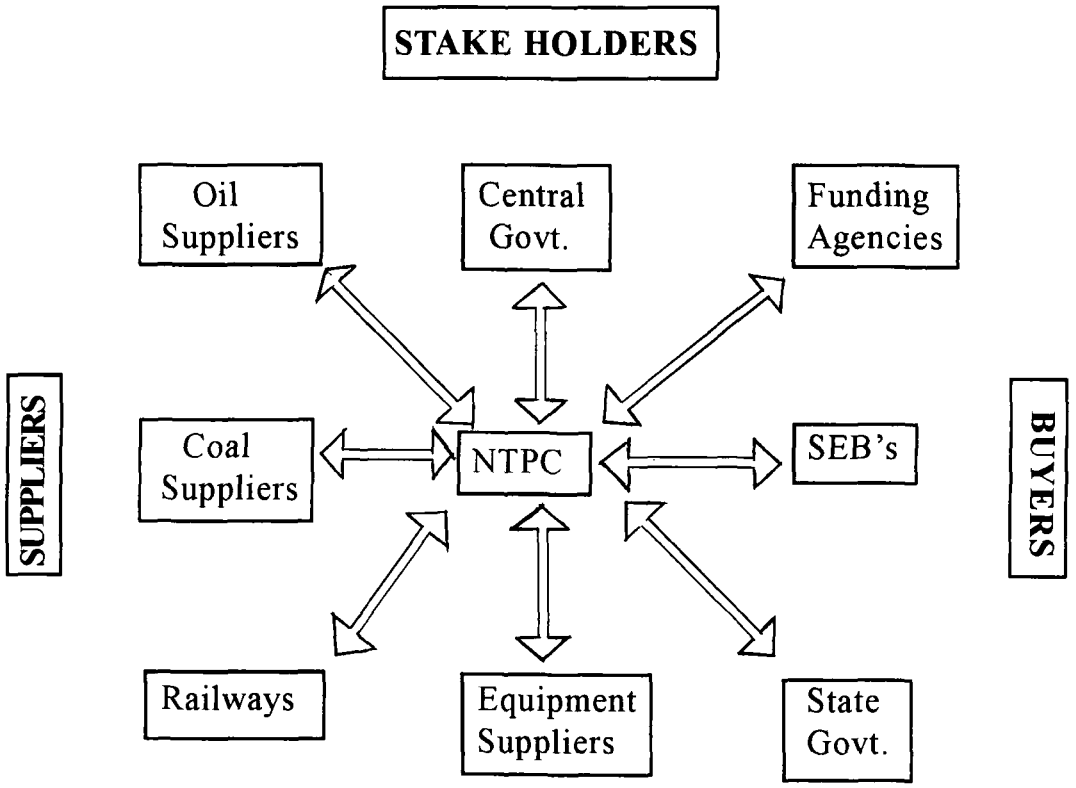

Fig. 5.1 : Flow of NTPC's Finances and Products

NTPC is a wholly owned company of the Government of India. Buyers of the NTPC product are Funding Agencies, State Electricity Boards, and State Government. Suppliers of input to the Corporation are Railways, Coal and Oil Corporation. The generation segment of the electricity sector was beset with problems associated with inability to tap resources like coal, oil and essential components for their running plants and plant equipment, steel, cement etc. for upcoming plants.

In a thermal power station auxiliary plants play a very important role. The main plants i.e., boiler, turbine and generator cannot run for a single minute without the support of auxiliary plants. Judicious lay out of auxiliary power supply system with proper interlocks and protection is a must for smooth and efficient running of power plant as a whole. The

modern thermal plant works on unit principle i.e. one boiler connected with one turbine, one generator, one unit transformer and associated unit auxiliaries. Common auxiliaries like water treatment plant, coal handling plant, fuel oil system, etc. require power before the running of unit. This initial power requirement of unit auxiliaries and common auxiliaries are met from station supply system. For this purpose supply must be continued for power generation system.

Water is used for cooling purposes and consumptive purposes. The consumptive requirement is very small. For cooling purposes normally large quantities of water is required.[3] However, in most of the NTPC stations, closed cycle cooling systems have been installed. In such cases only a small amount of make up water is required.

NTPC operates both conventional coal based power stations and gas/liquid based Combined Cycle Power Plants (CCPPs). The major equipment used in coal based stations are Steam Generators along with Electro-Static Precipitators, Turbo-Generators, Coal Handling Plant, Ash Handling Plant, Water Treatment Plan, Control and Instrumentation and off site Facilities. Major equipments used in gas/liquid fuel based CCPPs are Gas Turbines, Heat Recovery Steam Generators, Steam Turbines etc.

NTPC chooses its suppliers through well-defined tendering process which envisages the formulation of technical specifications incorporating the latest technologies and adherence to Qualifying Requirements for the bidders. The Qualifying Requirements are formulated to ensure the participation of the best suppliers in terms of products and experience. NTPC has aided in the development and improvement in the suppliers

products and services through rigorous quality checks and inspection. The major packages in a power plant are chosen through International Competitive Bidding.

Some of the prominent equipment and services providers for NTPC have been BHEL, Alstom Power, Larsen and Turbo Mitsui Babcock, Kirloskar etc. for mechanical equipment and auxiliaries. ABB, BHEL, Crompton Greaves, GE Power Controls, Siemens, Larsen and Turbo, Control and Switchgear Co. etc. for electrical equipment, Tata Honeywell, Siemens, Bailey Controls, Hartman and Braun, Instrumentation Limited - Kota, Keltron etc. for control and instrumentation equipment. And Hindustan Steelworks Construction Ltd., Engineering Projects India, National Building Construction Company, Bridge and Roof, Simplex, etc. for civil packages. NTPC has sourced state of the art gas turbines from reputed manufacturers such as Siemens, Alstom, MHI, etc. Corporation has entered into an agreement with M/s Godrej and Boyce Manufacturing Company Limited for their products viz. furniture and office equipment as stipulated for the Corporate Personnel.[4] The objective of the Procurement and Works policy in the Company is to make available, the needed equipment, material, works and services in the right quality and quantity, at the right time and at the right price after giving a fair and equal chance to all tenders.

Power Supply of NTPC to State Electricity Boards

India is currently plagued with wide spread power shortages. As such the entire capacity of NTPC has been utilised to meet the national demand.

For operation of the electric power system in India, the country has been divided into five regions, namely Northern, Western, Southern, Eastern and North-Eastern. NTPC has generally set up regional stations to supply electricity to various States in the region. However, a few stations i.e. Faridabad, Kayamkulam, Simhadri, Talcher Thermal and Tanda are supplying entire power to home States (i.e. the State where power plant is located) only.

As per the Electricity Act, power generating company has to sell its entire power to State Electricity Boards (SEBs) or State Utilities. NTPC has no partnership/strategic alliance with any of SEB/state utility. The power is allocated to various States by the Government as per their entitlement from Central generating stations, subject to beneficiary States/ SEBs concluding the Power Purchase Agreements for the purchase of power and opening/enhancing letters of credit of the requisite amounts for timely payments of monthly bills for the power allocated to them. Realisation of outstanding dues continues to remain a critical issue for NTPC. The outstanding dues as on 31st August, 2001 stood at the Rs. 19,128.63 crores and the realisation amounted to only 73.2 per cent of the billing.

Operating Performance of NTPC

Plant load factor is one of the parameters to measure capacity utilisation. Because of obsolete and inefficient plants, power generating companies are operating at a PLF of approximately 56 per cent compared to the world average of 75 per cent.[5] A high load factor is an indication of balanced load curve with relatively small load changes. High values of

demand factor, load factor, diversity factor and capacity factor are desired for economic operation of the plant and to produce electricity at less cost.

At 100 per cent load factor the installed capacity is utilized to the best possible extent and the maximum possible amount of energy is generated during the year. The cost per kWh is the minimum in this case.[6] When the load factor is lower than 100 per cent, less energy is produced giving a higher cost per kWh, since the non-varying fixed cost and lower operating cost are distributed over fewer kWh. As the load factor decreases, the cost per kWh increases. The thermal units under the NTPC maintained an impressive track record of PLF over the years. PLF has been furnished in table 5.2.

TABLE 5.2

PLANT LOAD FACTOR OF NTPC

(in percentage)

Year	Plant Load Factor
1990-91	61.7
1991-92	70.6
1992-93	70.0
1993-94	78.1
1994-95	76.6
1995-96	78.8
1996-97	77.0
1997-98	75.2
1998-99	76.6
1999-2K	80.4
2000-01	81.8

Source : Annual Report of NTPC, Govt. of India, New Delhi, 2000-01.

Table 5.2 showing the plant load factor of NTPC in percentage of different years from 1990-91 to 2000-01. It is evident from table 5.2 that the period under study has been marked with minor fluctuations in capacity utilisation or PLF of thermal plants under NTPC. The PLF of NTPC in 1990-91 was 61.7 per cent which went up to 70.6 per cent in 1991-92. From 1992-93 to 1993-94 the PLF increased from 70 per cent to 78.1 per cent. In 1994-95 it decline by 76.6 per cent. In 1995-96 PLF reached to 78.8 per cent. It goes down to 77 per cent in 1996-97. Similarly from 1997-98 to 1998-99 the operating performance of NTPC increased from 75.2 to 76.6 per cent. Again from 1999-2K to 2000-01 the PLF went up from 80.4 per cent to 81.8 per cent.

PLF of NTPC is around 80 per cent during the year 2000-01. This means that 20 per cent of the generating capacity is lost out or kept idle, due to improper logistic support or inefficient generation. One per cent increase in PLF would be equivalent to more than 500 MW of additional generating capacity. Six out of the ten best power stations of the country during the year 2000-01 in terms of PLF belonged to NTPC. The rich engineering expertise accumulated by NTPC, the hands-on experience in operating and maintaining power stations developed by it, and the sound management principles adopted by it have been gainfully put to use to turn around the performance of poorly performing stations. The Badarpur thermal power station which was given to NTPC for managing since 1977-78 became the test case for its capability.

The resounding success of the Badarpur experiment boosted the confidence of NTPC in its capabilities. It demonstrated its capabilities at the Unchahar thermal power station. This station was taken over from Uttar Pradesh Government and it was performing at a PLF of 20.86 per cent at the time of take-over. In 1998-99, this station acheived a PLF of 80.07 per cent. Performance on other counts also has improved dramatically.

The Corporation took up another turnaround venture in the Talcher thermal power station. This is a 460 MW station taken over from Orissa Government (Orissa State Electricity Board) in 1995 against its outstanding dues. This 35 year old station was performing at a level of 18 per cent PLF at the time of its takeover. But then NTPC with its proven calibre and scientific approach came out with flying colours. The PLF has already risen to 55.8 per cent. Talcher thermal power station generated 2488.7 MU during 2000-01. NTPC stations have performed at very high PLF and have helped improve the national PLF.

Consultancy Services of NTPC

As regards services, NTPC provides power related consultancy services in the areas of engineering and construction of power stations, contracting and procurement services, operation and maintenance of thermal power stations, R & M of power plants, owners engineer services, training services and financial and management consultancy. The consultancy group of NTPC targets both domestic as well as international customers. It has identified developing countries in South Asia, Middle East Asia and Africa as the target market. However presently the area of

focus is the domestic market.

NTPC is also registered as a Consultant with International Financial Institution such as World Bank and UNDP. Since its formation, NTPC has, through the Consultancy Wing, shared its expertise and experience with a large number of National and International Clients.[7]

NTPC Projects Abroad

Consultancy wing has secured several prestigious International Turn Key contract and consultancy assignment. These include two turn key contracts of Dubai Electricity and Water Authority (DEWA), Dubai, one for 132/400 KV transmission line from G-station on Al Mushrif and the other for 2 nos. 132 KV substations at Awir and Hatta.[8] Both assignments have been completed. Nepal Electricity Authority (NEA), Nepal has also awarded a contract for turnkey execution of 21 nos. of 132 KV/66 KV substations. NTPC has secured several other prestigious assignments from international agencies like EPDCI, Japan; National Development Corporation, Tanzania; Westmont, Malaysia; Hydro Electric Commission, Tasmania; Saudi Cable Company Marketing, Saudi Arabia; World Bank, Asian Development Bank etc.

NTPC's Technical Services

The company acts as an agent of Government/Public Sector Financial Institutions, to exercise, all the rights and powers exerciseable at any meeting of any company engaged in the planning, investigation, research, design and preparations of preliminary, feasibility/and definite project reports, construction, generation, operation and maintenance,

renovation and modernisation of power stations and projects, transmission, distribution and sale of power generated in respect of any share held by the government, public financial institutions, nationalised banks, nationalised insurance companies with a view to secure the most effective utilisation of the financial investments and loans in such companies and the most efficient development of the concerned industries.

The Corporation carries on the business of purchasing, selling, importing, exporting, producing, trading, manufacturing or otherwise dealing in all aspects of planning, investigation, research, design and preparation of preliminary, feasibility and definite project reports, construction, generation, operation and maintenance, renovation and modernisation of power stations and projects, transmission, distribution, sale of thermal/hydro power and power generated through Non-Conventional Renewable Energy Sources, power development including backward integration and to develop and deal in fuel (e.g. Coal, LNG, syngas, orimulsion, lignite, coal-bed methane etc.) in all its aspects and for that purpose to set up, promote, operate and carry on the business of coal mining, coal washeries, liquefied natural gas for supply of fuel to NTPC stations and also to undertake the business of other allied/ancillary industries including those for utilisation of steam generated at power stations, coal ash and other by-products and instal, operate and manage all necessary plants, establishments and works.[9]

NTPC's Earning from Consultancy and Other Services

Consultancy and other Technical Services have also been a source of income to the NTPC. The income generated on this account is computed

in table 5.3 below for the decade of nineties.

TABLE 5.3

EARNINGS OF NTPC FROM CONSULTANCY AND OTHER SERVICES

Year	Income from Consultancy and Other Services
1990-91	20.09
1991-92	138.43
1992-93	92.58
1993-94	47.45
1994-95	125.68
1995-96	199.46
1996-97	214.12
1997-98	277.39
1998-99	312.93
1999-00	729.82
2000-01	935.96

Source : Govt. of India, Annual Report of NTPC, New Delhi, 2000-01.

It is evident from table 5.3 that earnings of NTPC from consultancy and other services have been on rise consistently during the period 1990-91 to 2000-01. The income from this source which was a paltry Rs. 20.9 crores in 1990-91 reached the record figure of Rs. 935.96 crores in 2000-01, registering an overall hike of about 4558.73 per cent or 46.5 times during the decade. This spectacular performance reflects the high degree of effectiveness of NTPC's consultancy services based on its superb technical experience and know how in the area of thermal power generation.

Memorandum of Understanding (MoU)

In 1984, the Govt. of India appointed Arjun Sengupta Committee to review the policy in respect of Public Sector Enterprises. Following the recommendation of the Committee report, the Govt. of India introduced the concept of MoU in 1988 to improve the performance of the PSEs and to introduce an objective system of evaluation of the performance of the managements of the PSEs.[10] It is supposed to be a freely negotiated document between the government, acting as the owner of PSE, and a specific PSE. Second, it is supposed to clearly specify the intentions, obligations and mutual responsibilities of both parties to the MoU.

NTPC was among the first few PSUs to enter into a MoU with the Govt. of India in 1987-88, and has since been signing the MoU with the government every year. The MoU contains the ambitious target levels of performance with respect to addition of new capacity, construction of transmission lines, generation of power and financial performance including internal resource generation. These targets are fixed after detailed deliberations amongst all concerned agencies namely Central Electricity Authority (CEA), Ministry of Power, Planning Commission and other Ministries of the Govt. of India. NTPC has maintained its performance under the 'Excellent' category (the best category) ever since the MoU system became operative. The Company surpassed all its MoU targets with Govt. of India for the year 2000-01 and achieved Excellent rating for the 14th consecutive year.

Internal MoU in NTPC

NTPC has initiated a system of internal MoU, signed between the Directors and the Regional Head Quarters and Heads of various departments at the Corporate Centre. Internal MoU concept is based on the Principle of Management by objective. As a Public enterprise, NTPC enters into a MoU each year with the Government of India. For a growth-oriented organisation like NTPC it was felt necessary to have a proper system of managerial accountability to secure its sustained growth. Also, with the changing economic scenario and competition round the corner, it becomes essential to work on true business lines by creating profit centres coupled with accountability and functional autonomy for all round performance enhancement of the company. It is towards achievement of this goal that the internal MoU concept and its implementation was adopted within NTPC from the financial year 1998-99. The internal MoU sets annual targets, both quantitative and qualitative, of various functional parameters for the particular region and the Department of Corporate Centre and the performance is reviewed regularly in internal meetings. Shortfalls in performance are scrutinised and corrective measures initiated to bring up the performance to the desired level.

The internal MoU concept is introduced with the following objectives:

* To bring in role and functional clarity.
* To improve the quality of relationship between Management and the Managers.

* To define performance in totality and in a realistic manner.
* To adopt methodology for the evaluation of performance bringing in objectivity.
* To pave way for a healthy competition with the overall view of growth enhancement.

Many and varied benefits arise from the internal MoU. The distinct benefits amongst them are listed below :

* Integration of departmental goals/objectives with organisation goals and objectives.
* Provides clear-cut direction for the growth of the enterprise.
* Improves work culture and attitude.
* Facilitates identification of the weaknesses and strengths down the line.
* Defines the performance in clear terms and brings in enhanced accountability.
* Obtains tie-up/commitment of the inputs/support.
* Priorities multiple goals and objectives.
* Brings in the objectivity in departmental/functional performance evaluation methodology.
* Provides functional autonomy to departments.
* Enhances managerial/competitive skill.

Internalisation of MoU

At present the coverage of Internal MoU is in respect of the following areas :

1. Regional MoU covering the Plant/Project and regional activities in respective Regions.
2. Corporate functional MoU covering important functional activities of all Corporate functions.

The process

The process follows the Demings Principle of P-D-C-A i.e. **Plan-Do-Check-Act**. The **Planning** part includes the draft preparation by Regional Head Quarters and the Corporate functional Head of Departments. Towards this end, the respective Regions ask the units under their control to prepare the Annual MoU targets for the identified performance parameters. The unit head in turn asks the Departmental Heads to finalise the performance parameters. Thus the entire chain is operative and involve in the preparation of respective MoUs and drives the accountability and responsibility across the different levels. The draft MoUs thus prepared are forwarded for scrutiny by the MoU committee and finalised at the MoU Committee meeting with Region/Corporate functions representatives. The signing of MoU is done at the Management Committee Meeting where CMD and all functional Directors are present. The internal MoU is finalised and signed only after the external MoU of NTPC with Govt. of India is signed.

The **Do** part of the cycle is the actual performance of the units and the corporate functional departments consistent with the set targets.

The **Check** is through the monitoring at Unit levels during Site Management Committee meeting, and at the Regional Management

Committee by Regional Executive Directors. Deviations from the target figures are analysed and corrective actions are initiated. For all Corporate MoUs, similar reviews are carried out by the concerned HODs.

Actions taken accordingly facilitates each unit, region and respective corporate function achieve their targets. Organisational goals are thus achieved by integration of both corporate and departmental goals through a positive and healthy competition.

MoU Evaluation

At the end of the financial year, the MoU Committee formed at the Corporate level evaluates the performance with respect to the targets for each function and unit. Depending on the nature of activitie at different regions/corporate functions and their relative priorities, appropriate weightages are allotted to performance parameters in Operation, Finance, Commercial, Project implementation, Rehabilitation & Resettlement, Human Relations, Environmental, Ash utilisation, Inventory Management etc. The final overall scores for each region/corporate function is categorised as Excellent, Very Good, Good & Poor. The best performance amongst units and functions is recognised and appreciated at apex level meetings like Executive Committee Meeting and Management Committee Meetings.

MoU concept has enhanced the sense of belongingness and ownership feeling is further strengthened among all the members. Internal MoU is yet another positive step towards a successful organisation aimed at continuous improvement of performance and achievement of better

economic efficiency through participative target setting and objective performance evaluation.

Growth Strategy of NTPC :

NTPC has adopted multi-pronged growth strategy to become 30,000 plus MW company by year 2007. Meanwhile, NTPC expects to complete electrification of 62,000 villages by 2007 and the remaining villages by 2012.[11] The strategy includes capacity addition through green field projects, expansion of existing stations, joint ventures and take over of SEB's stations. Further, new business opportunities are being continuously explored through environment scanning and new business plans are adopted through mid course corrections.

Capacity Addition Programme : NTPC Corporate Plan envisages multi-pronged growth strategy for capacity addition through greenfield sites, expansion of existing projects, acquisition of running stations of SEBs and joint ventures.

I. On-going Projects

During 2000-01, NTPC has commissioned the 144 MW Steam Turbine unit at Faridabad GPP in July, 2000, ahead of schedule. The total capacity addition in Ninth Plan till date from on-going schemes is 2,640 MW including 440 MW of Tanda project taken over from UPSEB. NTPC is at present executing the following four power projects with a total capacity of 4,500 MW.

i) Simhadri (2x500 MW)

Major structural erection works have been completed. Condenser erection and TG erection for Unit-I have started in Aug. 2000 and Sept. 2000 respectively. 400 KV switchyard has been charged in Dec. 2000. Condenser erection and TG erection for Unit-II have started in Jan. '01 and Feb. '01 respectively. Sweet water pumps have been commissioned in Feb. '01. Unit-I Boiler Hydro-Test has been achieved in March '01. Work on various fronts is progressing on schedule. The first unit of 500 MW is scheduled for commissioning in March '02 and 2nd Unit (500 MW) by Dec. '02.

ii) Talcher Stage-II (4x500 MW)

The progress of work of the project is proceeding as per schedule. In Unit 3 boiler pressure part erection is in progress, boiler drum has been lifted in February 2001. Condenser erection and ESP foundation work for Unit-3 have commenced in March, 2001. Civil work in other areas such as CW system, cooling tower, track hopper, Ash dyke, PT plant etc. are in progress as per schedule. Concreting work in chimney shell of Unit-3 and 4 is in progress and has attained 235 metre height. Works in chimney shell of unit 5 and 6 has also started in December, 2000.

The first unit is expected to be commissioned as per schedule in the financial year 2003-04.

iii) Rihand Stage-II (2x500 MW)

Various clearances/tie-ups for the project have been obtained including techno-economic clearance by CEA. Power Purchase Agreements

have been signed with various beneficiaries of northern region. Appraisal of the project has been completed by ICICI. Investment approval for the project has been cleared by the Board in May, 2001. Award for main plant package in respect of bid received under International Competitive Bidding has been placed in August, 2001. The first unit is scheduled for commissioning during the financial year 2005-06.

iv) Ramagundam Stage III (500 MW)

Various clearances/tie-ups for the project have been obtained including techno-economic clearance by CEA. Project appraisal has been completed by ICICI. PPA has been signed with AP TRANSCO, Karnataka, Kerala and Pondicherry and is in advanced stage of finalisation with Tamil Nadu. Investment approval for the project has been cleared by the Board in May, 2001. Award for main plant package in respect of bid received under International Competitive Bidding has been placed in August, 2001. The unit is scheduled for Commissioning during the financial year 2005-06.

II. CEA Cleared New Projects

1. Sipat Stage-I (3x660 MW)

Sipat STPP stage-I (3x660 MW), is a greenfield project and is proposed to be set up in Bilaspur district of Chhattisgarh. Various key linkages/clearances for the project such as coal linkage, Central Water Commission concurrence from water availability angle, forest and environmental clearances from Ministry of Environment and Forests and CEA's techno-economic clearance have been obtained for Sipat STPP Stage-I (3x660 MW) with Super critical parameters. PPAs have been signed

with MPEB, Daman & Diu and Dadra & Nagar Haveli and are under finalisation with other beneficiaries of western region. Appraisal of the project has been completed by IDBI. Land for critical area has been acquired and site levelling taken up. Bids for main plant equipment have been invited.

2. Koldam Hydro Electric Power Project (800 MW)

Koldam hydro electric power project (800 MW) in Bilaspur district of Himachal Pradesh, identified as a mega power project by the government, has been taken over by NTPC from Himachal Pradesh State Electricity Board (HPSEB). CEA clearance obtained earlier by HPSEB was transferred in the name of NTPC in May, 2000. Development of infrastructure facilities, land acquisition etc. are progressing in full swing. NTPC has appointed M/s. EDF, France, a leading international company in power sector as prime consultant for Koldam project. Investigation and studies required for detail design have already been taken up by M/s EDF. Detailed project report has been updated and submitted to CEA for clearance. Construction of Diversion Tunnel started during 2002-2003.

3. Kawas-II (650 MW), Jhanor-Gandhar-II (650 MW), Gujarat; Anta-II (650 MW), Rajasthan and Auraiya-II (650 MW), Uttar Pradesh.

These projects have been identified by Government of India as mega power projects. Various tie-ups/clearances including those from Ministry of Environment and Forests (MoEF) and CEA are available. Appraisals for these projects have been completed by IDBI/SBI Caps. Further activities for these projects were deferred due to wide fluctuations

in naphtha prices and uncertainty in prices/terms and schedule of LNG resulting in increase of estimated cost of generation due to which some of the major beneficiaries have indicated their reluctance to take power from these projects. Further action on these projects would be taken up after confirmation of fixed and reasonable price of LNG acceptable to beneficiaries.[12]

Joint Venture Companies of NTPC

As part of growth strategy identified in the Corporate Plan, the Company has identified formation of joint ventures and strategic alliances as a key to continued success. In pursuance of this objective the NTPC has already adopted a two pronged strategy. On the one hand it has entered into joint venture business with certain organisations of repute and, on the other, it is planning to acquire certain business units through take-overs. The details of the joint ventures and take overs are given below :

(a) Joint Venture Companies of NTPC :

(i) NTPC-ALSTOM Power Services Pvt. Limited (NASL)

NASL is a joint venture company of NTPC and ALSTOM Power for taking up Renovation and Modernisation assignments of power plants in India and SAARC Countries. NTPC holds 50 per cent equity in NASL and the balance is held by Alstom Power.

(ii) Power Trading Corporation (PTC)

Power Trading Corporation of India Limited has been framed with 30 per cent equity contribution from POWERGRID, 15 per cent from

NTPC, and 15 per cent from Power Finance Corporation. Balance 40 per cent shall be offered to State Governments, SEBs, other financial institutions and public at large. The PTC would purchase power from identified private projects and sell it to the identified State Electricity Boards.

(iii) Utility Powertech Limited (UPL)

UPL, a joint venture company of NTPC and BSES, was incorporated to take up construction, erection and supervision in power sector and other sectors in India and abroad. NTPC holds 50 per cent equity in UPL.

(iv) NTPC-SAIL Power Company Pvt. Ltd. (NSPCL)

NTPC has formed a joint venture company with SAIL to take over and run the Captive Power Plant (CPP-II, 120 MW each) of Durgapur and Rourkela Steel Plants. NTPC holds 50 per cent equity in NSPCL.[13]

(v) Bhilai Electric Supply Company Limited (BESCL)

NTPC has formed another joint ventures company with SAIL to take over and run the Captive Power Plant (CPP-II), of capacity 74 MW, of Bhilai Steel Plant. NTPC holds 50 per cent equity in this joint venture too.

(b) Joint Ventures and take-overs under consideration by NTPC :

(i) An MoU has been signed with Indian Oil Corporation in May, 2001 for development of petro fuel based power plants in joint ventures. Viable projects, based on refinary residue or LNG are being examined for further study and implementation.

(ii) An MoU has been signed with TNEB for setting up a 1,000 MW coal based power plant, in joint venture, at Ennore in Tamilnadu, utilizing the existing infrastructure facility at Ennore port.

(iii) An MoU has also been signed with the Indian Railways for setting two coal based power plants, in joint venture, of up to 2,000 MW capacity, one in the western region and the other in the southern region.

(iv) NTPC is examining the possibility of forming a joint venture with BHEL for taking up EPC contracts and maintenance assignments of both NTPC and BHEL.

(v) NTPC is examining the possibility of taking over the existing power plants at Birsinghpur and Amarkantak in Madhya Pradesh in joint venture. It is also examining the possibility of expanding either of these power projects through expansion.

(vi) NTPC is also looking into the possibilities of setting up a gas based power plant in Bangladesh in joint venture with Bangladesh Power Development Board and gas supplying agency. The excess power generated by this company may be transferred to the power starved States of India.

(vii) NTPC is exploring the possibilities of setting up coal Bed Methane power projects in joint venture with ONGC and West Bengal Government.

(viii) NTPC is at present studying the possibility of taking over the nonperforming power plants at Muzaffarpur TPS (220 MW) and

Barauni TPS (355 MW) in Bihar State. Ib Valley TPS (420 MW) in Orissa State is also being similarly examined. The outstanding dues of these States will be adjusted against the transfer price of these power stations, in case of take over.

Diversification of NTPC

NTPC has signed an agreement with Himachal Pradesh Government in Feb., 2000 for implementation of Koldam hydro project in Himachal Pradesh. The predevelopment activities on the project are in full swing. Further, NTPC is examining the following projects as potential hydro proejcts for implementation by NTPC :

* Pala-Maneri in Uttranchal (Bhagirati) of 416 MW.
* Lohari-Nagpala in Uttranchal of 520MW.
* Tapovan-Vishnogad in Uttranchal (Alaknanda) of 360 MW.[14]
* Shongtong-Karcham in Himachal Pradesh (Satluj) of 402 MW.
* Mahadayi in Karnataka (Mahadayi) of 345 MW.

NTPC is looking into the possibility of forming a subsidiary company to take up prospective small and medium hydro projects in India with a capacity ranging from 25 MW to 250 MW.

NTPC is all set to establish a wholly owned power trading arm in Kerala and make a foray into coal washeries business. The company to buy cheap power from the eastern grid and mix it with the more expensive gas-based electricity generated at 350 MW Kayakulam plant in Kerala.[15] Ministry of power has assigned NTPC responsibility of providing

consultancy for Renovation and Modernisation of thermal power stations of SEBs. Under Accelerated Power Development and Reform Programme (APDRP). There are approximately thirty thermal power stations covering more than 106 units, which have to undergo R&M. To start with NTPC has presently taken up five stations comprising 1,880 MW.

CORPORATE FUNCTIONS OF NTPC

The NTPC, in addition to the erection of plant for power generation, also performs numerous commercial functions. These functions include engineering services, contract/procurement and management for the supply of equipment, material, services, etc. The area and scope of activities involved in such functions are discussed below :

I. The Contracts Management Function

The objective of the contracts/procurement function in NTPC is to make available the required equipment/material/works/services of the right quality in right quantity at the right price so as to reach the specified place at the right time.

NTPC being a utility organisation with projects located away from the Corporate office, has divided the responsibility of contracts management, both pre-award and post-award, between the Corporate office and Project site. A contract management function being an independent specialised techno-commercial function to meet the overall Corporate objective in the area of project procurement has been in place since inception under a department named as 'Corporate Contracts' within the organisation structure of NTPC. The 'Corporate Contracts' Department

procures plant/equipment and services for its projects which are characterised by adherence to the procurement procedures of external funding agencies, factoring of long delivery schedules of equipment, intense engineering coordination and a specialised engineering knowledge. The Corporate Contracts Division is the process owner for award of all such contracts including high value civil works, its monitoring and post award follow up since the delivery of equipment from the supplier's works till the closure of the contracts. The receipt and installation of the plant and equipment and its execution is the responsibility of the project site.

There are a number of other small value contracts with lesser degree of engineering coordination, whose pre-award and post-award activities are handled by the Project Sites. The principles and guidelines followed for these Site contracts are similar to those applicable for the Corporate contracts. In view of the complexity involved in the construction of thermal generation projects, the Contracts Management Systems calls for further sharing of responsibilities for specialized functions such as Engineering, Finance, Cost Engineering, Quality Assurance and Inspection at Corporate Centre and Erection, Site Finance, Field Quality Assurance etc. at the Project Site. The coordination and division of responsibility between these departments at two responsibility centres is also clearly defined.

II. Pre-Award Contracts Management

In the pre-award contract management system, the Corporate Contracts Division has a key responsibility of identification of contract packages upto the time of the award of contract.

III. Post-Award Contract Management

Though the selection of contractor through an effective and efficient pre-award contract management system is considered as a major factor leading to successful execution of a contract, the award of contract is not the end of the procurement process. Rather, it is the beginning of a long and complex set of operations. To carry out at these operations in an effective and time bound manner, the post-award contract management system in NTPC calls for sharing of responsibilities by more than one department in all stages of contract execution.

After the award of contract, the execution of contract involves the following broad division of responsibilities between various functions at Corproate Centre and the Project site.

A) Corporate Contracts : The Corporate Contract Department is responsible, as a focal point, for all post-award coordination till the delivery of the equipment at the project site. Some of the major responsibilities include signing of contract agreement with the contractor and its internal distribution, obtaining performance and advance securities and processing of initial advance payment to the contractor, processing of payment against contracts awarded to foreign suppliers involving payments in foreign currencies etc. and issuing the required amendments/modifications to the contract as may be necessitated during execution of the contract.

B) Engineering : The Project Engineering Division at Corproate Centre is responsible for entire detailed engineering coordination. This includes approval of manufacturing/construction drawings, providing technical

information to the contractor, identification of changes in the technical specification necessitated during actual work execution, monitoring of issues related to erection/construction drawings etc.

C) Quality Assurance and Inspection : The Quality Assurance and Inspection Department at Corporate Centre is repsonsible for finalisation and approval of Contract Quality Plans and carrying out of physical inspection/testing of equipment at manufacturers works. NTPC also has inspection offices located at the regional headquarters, important cities as well as the major suppliers works for carrying out the inspection function in an expeditious manner.

D) Finance : The Finance Department at Corporate Centre is repsonsible for release of initial advance to the contractor and also the further payments involving payments in foreign currencies against contracts awarded to foreign suppliers. All other payments to the contractors are released by finance department at the project sites. The respective finance departments are also responsible for maintaining and seeking timely extensions to the validity of bank guarantees furnished by the contractors towards performance securities and advance payments in consultation with Corporate Contracts/Project site.

E) Project Site : Project site is responsible for the entire coordination of the work at site. The responsibilities include monitoring of receipt of material, identifying space for contractor's site office establishment, ensuring timely receipt of contractor's erection/construction equipment, review of manpower deployment of contractor, providing site fronts and other inputs

such as electricity, water and owner issues material to the contractor, supervision/monitoring of erection/construction work, start up activities, trial operation, performance and guarantee tests to be carried out by the contractor and processing of payments as per the contract terms. There is further division of these responsibilities between various departments such as Erection/Construction, Field Quality Assurance, Finance, Materials etc. at the project site.

IV. Post Award Contract Planning and Monitoring

Each contract envisages periodic Contract Review Meetings which are organised for planning and review of the progress of work. The representative of the owner and contractor from the concerned functions of the respective organisations attend these meetings. A system of organising project review teams meetings on monthly basis during construction stage of the project is adopted. Senior level representatives of all concerned departments involved in the project execution attend these meetings. The circumstances leading to common claim situations such as delays in release of payments, issuance of necessary amendments to the contract for the changed work content and providing necessary inputs to the contractor are closely monitored to ensure timely actions.

Cost Control System : NTPC has a laid down procedure for the project control system. The basic responsibility of cost control arising from change in the Bill of Quantities/Scope of work, is that of the engineering function.

Contract Budgeting System : The payment to contractors against various contracts involves large requirement of funds. The effective management of

such large funds is done through a budgeting system. The yearly budget for a contract packages is based on detailed payment schedule normally tied up with the contractor at the time of award.

Contract Closing : After fulfillment of all the obligations by the contractor and completion of the defect liability period, the contractor is discharged of its obligations in the contract. The above activity is concluded by way of formal closing of contract. The system also envisages receipt of a 'No Claim Certificate' from the contractor. After receipt of all the requisite certificates, the contract is considered for formal closing after approval of the Competent Authority.

Contract Documentation : The various documents are made available at the respective work places in the organization as per their distribution codes so as to facilitate smooth execution of the contract. The documents are assigned a unique code number as per the identified procedure. For quick referencing and easy retrievability, data/information are being stored on computers. Use of microfilming is made for storage of various documents/ drawings for the project.

The effectiveness of contract management system in NTPC has been demonstrated a number of times by its successful and timely completion of power projects and has been acclaimed as one of the best by the multilateral international financing institutions. Not only the power industry but other businsses have also evinced interest in adopting processes of contracts management similar to NTPC. The Corporate contracts are also providing specialised procurement services to a number of businesses.

Management of contracts involving contracts labour in compliance with the statutory requirements is always a challenging task for the engineer in charge and the personnel manager. Ensuring provident fund for the contract labour is one of the important monitoring aspects associated in all these cases. Quite often there are lapses on this account, which snowball into major issues in management of contract labour. Poor record keeping on the part of the contractor was identified as one of the important reasons for problem in this area.

(2) Corporate Materials Management

The Corporate Materials Management, as it is called now with its own distinct identity, came into existence in mid 1983. It was a part of contract services function earlier and different groups under contract services managed the materials management of steel, cement, expediting transport and custom clearance activities etc. Materials Management is responsible for policy making in respect of all systems and processes that are adopted as standards throughout the organisation for inventory management, risk management, systems and customs clearance of imported materials. The department has five sub groups for meeting the overall objectives which are as follows.

A. Systems and Inventory Management Group

B. Import Coordination and Customs Clearance Group

C. Risk Management and Insurance Group.

D. Corporate Materials Procurement Group.

Each of this group is endowed with separate responsibilities and adopts functional processes to fulfil the objectives of corporate materials management.

Systems and Inventory Management

The NTPC which has plants at various locations throughout the country requires uniform systems and procedures for inventory management and procurement of spares. In order to achieve an effective control on the inventory the SIM Group devised mechanism for close monitoring and analysis of inventory held at each plant. Inventory holding norms were introduced for various categories and were circulated to all the plants for implementation. The inventory classification and codification helped monitoring of all the items closely and facilitated decision making for procurement of new items. For a new project the build up of inventory is checked right from the inception by reallocation of surplus materials like steel, cables, equipment etc. at existing plants through interaction with the engineering function so that these be factored for utilisation at the engineering stage itself.

B. Import Coordination and Customs Clearance

The construction of power plants through open global contracts resulted in large scale import and custom clearance of equipment arriving through sea and air routes during strict foreign exchange regimes. In addition to this the huge requirement of cement and steel from the regulated industry of indigenous manufactures was a challenge for project execution. In order to acheive expeditious inflow of materials to the project site,

Transport and Custom Clearance Offices started functioning, in addition to Delhi, at major ports of Bombay, Calcutta and Madras. The custom duty and port charges were arranged and controlled by this Group from Delhi. As the organisation grew, the activities of import coordination, custom clearance, import licensing and duty exemption were becoming significantly important. Besides this, the release of foreign exchange and approvals from Reserve Bank of India and Director General of Foreign Trade were some of the important tasks managed by this Group.

In 1990, when regionalisation/decentralisation was under active consideration within the organisation, it was thought essential to decentralise the Transport and Custom Clearance, Expediting offices and functions at Calcutta, Bombay and Madras. Since then they are treated as part of regional offices. However, the Import Coordination and Custom Clearance Group of the Corporate Material Management continues to provide the professional guidance to the port offices as and when required.

C. Risk Management and Insurance

Since early eighties the projects started coming to operation phase, beginning with Singrauli and followed by Korba, Ramgundam and Farakka. The contractors and the equipment suppliers arranged for the insurance during the construction and commissioning phase of the project. However once the plant was operationalised there was a strong need for operation and maintenance. Corporate Materials Group developed insurance policy guidelines to cover various aspects of insurance functions, the socpe of insurance coverage of various plant and equipment, risk exclusions etc.

Optimising the insurance premium and distribution of the insurance business amongst the nationalised insurance companies, coordinating with the plants and insurance companies for resolution of issues are some of the tasks the Risk Management and Insurance Group manages.

D. Corporate Materials Procurement

The procurement of high value and bulk material and supporting the processes at various stations is one of the key functions of this group. In addition to this the group continually works on developing and disseminating the various system and procedures in contracting for uniform adoption of systems in procurement and inventory management within the organisation. The group has evolved the following system manuals and all the stations are adopting these uniformly.

* Purchase management system manual.
* Stores management system manual.
* Transport management system manual.
* Inventory management system manual.
* Claim procedures and documents for marine insurance policy.
* Policy guidelines for according Small Scale Industries.
* Insurance Policy guidelines for thermal and gas power stations.

The manuals comprise all the activities to be undertaken by the plant in day to day functions of procurement, transportation, etc. The manuals issued played a very vital role in introducing the standards for work of different projects and plant of NTPC irrespective of their geographical locations. Corporate Materials Procurement Group has traveled a long way

to establish itself as a professionally managed function keeping pace with the continuous growth of the organisation.

(3) Corporate Commercial

The Corporate Commercial in NTPC has since 1983 been involved in devising innovative practices to meet the challenges thrown up in different functional areas from time to time. Some of the important practices evolved are described below in brief :

Power Purchase Agreements

Inter-utility exchange of power prior to 1982 was not based on formal and binding contractual arrangements. It was done on the basis of informal understanding between the concerned parties. Subsequent to the commencement of power supply by NTPC, formal Memorandum of Understandings/Bulk Power Supply Agreements/Power Purchase Agreements were signed with all the beneficiaries. The initial provisions in these agreements have been periodically reviewed and progressively improved upon to cover various eventualities and to make them legally binding. NTPC has thus been responsible for introducing a practice of signing detailed legal agreements for power supply and transmission services in the power sector.

Regional Energy Accounting

Prior to the establishment of the Central Sector stations, there were only occasional bilateral exchanges between contiguous States, making it possible to meter the supply/drawals at the inter-State exchange points. The concept of regional energy accounting recognised that the total supplies

must match the total drawls, if transmission losses were appropriately accounted for. While it was possible to meter the total power supplied by the generating stations and also the total drawal of each beneficiary, it was not possible to directly meter the drawal of each beneficiary from individual power stations. The system of Regional Energy Accounting enabled the allocation of power supplied from each power station to various beneficiaries by doing so on the basis of pre-determined criteria. The criterion adopted in global energy accounting followed in the northern region was based on booking of shares from various power stations in their ascending order of cost. This meant that the beneficiaries utilised their cheaper shares first and the higher cost shares were booked to them only later. NTPC's involvement in evolving and implementing Regional Energy Accounting System in northern, western, southern and eastern regions was a major contribution to the promotion of inter-State and inter-regional exchange of power.

Direct Supply of Power to Bulk Consumers

NTPC approached Government of India for permission to allow supply of power directly to some strategic bulk consumers like Railways being the fuel carrier and Coal India Limited the major fuel supplier. Railways and Coal India have been complaining about interruptions in their operations and lack of uninterrupted power supply. NTPC impressed upon Government of India that direct power supply by NTPC to these consumers will enhance their productivity, which, in turn, would ensure timely and adequate availability of fuel at NTPC stations, eventually increasing generation at these stations.

Various measures like management of information system and adoption of Integrated Commercial Management System, formation of tariff policy group to focus on regulatory issues, posting of commercial executives at State Electricity Boards and NTPC power stations, workshop on availability based tariff, intra-departmental Memorandum of Understandings and customer meets, etc., were adopted by the Corporate Commercial Department for improving commercial/business aspects of the company.

4. Cost Engineering

Cost Engineering as a department came into being only in 1983, though some of its functions were being performed earlier by other departments. In the past seventeen years, in its own small but significant way, cost engineering has contributed to the overall outstanding performance that NTPC has consistently demonstrated in the power sector. It prepares the project cost estimates including financial analysis for all feasibility reports of new projects of NTPC. Involvement of cost engineering continues until techno-economic clearance from the Central Electricity Authority is obtained, followed by clearance by government. During these appraisals, cost engineering has been interacting with these agencies extensively and all of them appreciated the financial model developed in-house by cost engineering. This spreadsheet model, originally developed in Lotus 123 and later converted to MS Excel, is capable of all feasibility calculation, such as phased funding, interest during construction, working capital margin, cost of generation and internal rate of return, it is sensitive in respect of various parameters. Another important activity of cost engineering is freezing of cost estimates along with various project sites and

preparation of Corporate budget for the annual plan document. Over the years, NTPC's annual plan has evolved into an excellent compilation of data covering various phases of the projects, viz. Construction, Operation and Renovation and Modernisation.

5. Research and Development in NTPC

Significance of an in-house Research and Development wing for optimum availability and reliability in power generation was realised in NTPC right from its inception stage as plants one after the other were operationalised. The R & D establishment envisaged to bridge the power industry and the research, to initiate new technology adoption, and resolve technical problems faced by the industry. The NTPC with its large power stations also required support of advanced research to enhance productivity and quality of generation. The R & D Department which was formed early moved into its custom made building at NOIDA in January 1993. With its various sophisticated facilities and expertise in applied research, the following practices adopted significantly contributed to the development of technology and provided useful feedback to power station operation and design engineers.

* Failure investigation of boiler tubes and other critical components.
* Non-destructive testing and health assessment studies of boiler and turbine components.
* Pollution monitoring and control.
* Corrosion monitoring and prevention etc.

Thus, the R & D Department activities include laboratory and field studies and the Department is catering to the failure and investigative needs to provide guidance to power stations run by NTPC and other utilities in the power section.

Research Division in R & D

The R & D is divided into functional specialization wings so as to facilitate advanced research in specific areas.

Analytical Laboratory : The analytical laboratory carries out testing of several samples including effluents, metals, potable water, corrosion products, raw chemicals, coal, coal ash, boiler feed water, water from water steam-cycle for heavy metals, and other chemical constituents. The Group is presently working on the following research projects :

* Alternative to hazardous chemical like chlorine.
* Removal of colloidal silica using ultra filtration.
* Study of mercury in coal.

Coal and Combustion Laboratory : Coal and combustion laboratory carries out combustion related studies of the coal with the help of equipment like Leitz heating microscope, particle size analyser, etc. The Group is analysing samples of coal, ash, clinker, unburnt residues, from different stations. Besides this, the Group is also working on research projects like :

* High unburnt carbon formation problem in power stations.
* Weathering effect of coal in stack-yard.
* Study of ash constituents and furnace atmosphere responsible for

slagging and clinkering problem.

* Study effectiveness of coal washing.

Oil and Lubrication Laboratory : This laboratory is engaged in monitoring the health of over 250 high voltage transformers and reactors through dissolved gas analysis. Many catastrophic failures are prevented through regular condition monitoring. This Group also suggests remedial measures to resolve problems of mixing indigenous oils with imported ones and carries out monitoring of turbine lubricating oils and control fluids. The Group is presently carrying out research activities like :

* Residual life estimation of transformers through monitoring of paper degradation products in oils.

* Regeneration of control fluids through fuellers earth.

Non-Destructive Testing Laboratory : This laboratory is engaged in the Non-Destructive Testing and health assessment studies of critical boiler and turbine components of power plant during the unit overhaul/shut downs. The tests normally carried out are ultrasonic testing, thickness measurement, hardness surveys, magnetic particle examination, etc. Besides the regular testing activities, the group is undertaking condition monitoring of bushings of transformers and residual life assessment of super heater and re-heater tubes through measurement of thickness of oxide layer in the boiler tubes, etc.

(6) Environment Management in NTPC

NTPC while spearheading the process of accelerated development of the power sector in the country is equally conscious of the environment

degradation and continues to take various pro-active measures for protection of the environment and ecology around its projects. NTPC was the first among the power utilities in India to start Environment Impact Assessment (EIA) studies to identify and evolve suitable mitigatory measures at the project appraisal stage itself. These measures are in-built in the designs during project engineering stage and are incorporated in the construction stage. Once the plants come into operation stage, regular monitoring of various environmental parameters and periodic Environmental Audits and Reviews are conducted and suitable remedial actions are taken to ensure compliance with statutory requirements. Close interaction is maintained with various regulatory bodies and financial institutions in order to keep abreast with the latest developments in the field of environment.

NTPC has constituted different Environmental Groups for carrying out specific environment related functions which are as follows :

The Environment Engineering Group (EEG) at the Corporate associates with engineering services in the site selection, undertaking the EIA studies for new project sites, obtaining environmental clearances, finalisation of specification of pollution monitoring equipments and works related to pre-operational stages of the projects.

Environment Management Groups (EMG) were constituted in NTPC in 1991-92 at all stations, Regional Headquarters and at the Corporate Centre. These provide adequate thrust to the environment functions during the operational stage of the plants, formulate the environment policy, maintain compliance with the statutory norms and initiate mitigatory measures to minimise pollution and its impact.

NTPC has been conducting EIA studies extending to around one year period in all its major power projects. This consists of literature search, field studies and impact assessment in the area of land use, water use, socio-economic aspects, soil hydrology water quality, meteorology, air quality, terrestrial and aquatic ecology and noise. The EIA involves stage by stage evaluation of various parameters, which affect the environment.

NTPC has initiated on-line programme for a computerized "Prayavaran Monitoring System" which will provide reliable storage and prompt and accurate flow of information on various environmental related parameters among generating stations, regions and the Corporate Centre.

Ash Utilisation

During the year 2000-01, 30 lakh tonnes of ash has been utilized for various productive purpose. Major utilization was in the areas of cement and asbestos industry, ash dyke raising and land development and embankment. One more pilot brick manufacturing plant was commissioned during the period at Unchahar raising the total number to eleven at NTPC stations. So far more than seventy million ash bricks have been manufactured at these plants and utilized for various in-house construction activities. Construction work at new NTPC projects of Simhadri and Sipat as also at their townships are being done completely with ash bricks. Large quantity of ash from Badarpur Ash Pond is being used in prestigious projects around Delhi such as Delhi Metro Rail Corporation, Noida-Greater Noida Expressway and Delhi Flyovers. Bottom ash from Ramagundam super thermal power station is being utilized for underground mine stowing in the mines of M/s Singareni Collieries Limited.

Afforestation

The company is not lacking in the promotion of ecology. It is engaged in tree plantations in the project areas and its surroundings. Saving the existing trees, planting the trees right at the beginning of construction activities, preservation of trees and seeking advice from State Forest Department and Agricultural Universities are generally being followed in various NTPC units. The appropriate afforestation programmes for plant, township and green belt areas of the project are prepared for implementation at the site. The species are selected on the basis of their adaptability and local soil conditions. In all NTPC projects taken together, there are approximately 140 lakh plantations till 2000-01. In order to up-date itself with the global technology innovations in the field of environment, NTPC takes pro-active measures in organising International Seminars and Conferences in environment related areas.

(7) Energy Audits in NTPC

Energy audit is another important corporate function of NTPC. Energy audit is a technical survey, which helps to identify conservation opportunities and allows them to be translated into projects. It is a systematic study and analysis of primary energy inputs, local generation of secondary energy and pattern of specific energy consumption in various subsystems of the power plant. NTPC negates the common belief that electricity producers do not have any role in energy conservations. It is this belief that necessitates taking steps in energy conservation in various day to day operations in running of the power plant. About 7 to 9 per cent of the

electricity produced by any power station is consumed in-house in running various auxiliaries in addition to consumption of various other forms of energy viz. coal, oil, heat, water, chemical, etc. In fact, the energy audit's importance and necessity can be well understood in the overall operation and maintenance management system and the process of energy audits has been made mandatory in all NTPC power plants.

Energy auditing is introduced in NTPC at plant level as an effective tool to ensure best possible efficiency. Every year the Corporate Energy Conservation Group issues list of systems for energy audits to all projects and requests them to submit their schedule for carrying out audit in the ensuing financial year. On receipt of proposed energy audit schedule from different projects, the same are analysed and compiled at Corporate level so that interfaces with the operation services and other corporate groups are factored in. The approved energy audit annual schedule is then forwarded to the respective projects for implementation. The Corporate Energy Conservation Group also issues standard audit procedures for such audits so that guidelines are available at site for implementation. As a part of the process a brief report of energy audit is prepared within a week of completion of energy audit, indicating :

* Major observations
* Major recommendations including highlights of any new technology recommended.
* Major savings potential in terns of energy and money.
* Time bound action plan for implementation of major recommendations.

The draft detailed report is circulated and copies sent to the Corporate and regional groups for comments before finalisation. The finalised report is submitted to Director (O) along with the status of implementation of action plan according to the recommendations.

8. Quality Management in NTPC

In order to realise the mission of providing power in plenty, the NTPC adopted a three pronged strategy for control of time, quality and cost as important parameters in its project management endeavour. Quality was always in focus and thus a need for a relation of partnership with the Indian industry to supply quality products to NTPC emerged. A philosophy that quality has to be "built-in" in the product rather than "inspected" was adopted and thus the quality assurance procedures for all the stages of design, planning, procurement, manufacture, testing and commissioning were built-in as a part of an integrated quality management system of NTPC.

In 1977, a Quality Assurance Group was constituted in NTPC as a part of the Contract Commercial Group. The primary objective behind the decision to connect Quality Assurance Group with the Contract Services Group was that it should play a leading role in specifying and implementing quality assurance aspects in the procurement of various types of power equipment for the NTPC stations. The Quality Assurance Group also took part in the technical evaluation of the bids to review the overall quality systems to be adopted by the manufacturers or contractors. A unique feature which was specifically insisted upon by NTPC was the development of a quality plan listing various stages of manufacturing, right from raw

materials to the despatch of equipment, indicating the various quality checks to be carried out along with the characteristics to be checked, quantum of checks, reference documents, acceptance norms, records to be maintained and the agency to be assigned the task of performing these checks. The plan document was finalised before the start of manufacture of equipment and gave clear-cut guidelines on various requirements both to the manufacturer and the inspection engineers with regard to what is to be checked, how much is to be checked and the norms to be achieved. Depending upon the confidence in the quality systems of the manufacturer, involvement of NTPC was identified at some selected stages by indicating "customer hold points". It is mandatory that manufacturing shall not proceed beyond such customer hold point stages without clearance from NTPC.

In the first five years of operation of the Quality Assurance Department when the various orders for Singrauli and Korba 200 MW were executed, the above concept was implemented very successfully and detailed quality plans for manufacturing and field activities were finalised. Also, sub-vendors lists for all major bought out items and the controls to be exercised during procurement were formalised. However, the first major turbine meant for Singrauli 200 MW was found deficient in meeting the ultrasonic acceptance norms as finalised in the quality plan and was replaced. This and some subsequent events of this type work up the manufacturers to the systematic efforts of NTPC as well as product knowledge of the NTPC-Quality Assurance and Inspection Engineers. Thus, the equipment suppliers realised that NTPC meant business. They on their own started checking the equipment far more carefully than was done earlier

before offering it to NTPC.

In 1982, NTPC signed a Memorandum of Understanding with the Central Electricity Generation Board, UK. A number of executives were trained as quality system assessor at Central Electricity Generation Board under this MoU. They took up quality system audit of major equipment suppliers, in collaboration with Central Electricity Generation Board experts. With the objective of assessing the effectiveness and adequacy of the quality system the base documents viz. the NTPC contract quality system requirements, quality plan and British Standard BS-5750 were adopted. Each audit was followed up with a detailed report of the findings to design specification. An important starting point was to specify in detail both the quality and reliability requirements. Accordingly, the specifications were drawn up, detailing the quality system requirements and the quality characteristics to be ensured for various types of power equipment. Greater emphasis was laid on quality systems like design control, procurement control, manufacturing control and erection control so as to ensure quality in all phases of project execution. A detailed write-up on the quality system requirements to be implemented by various contractors was compiled and made available for every contract.

Since power plant equipment has a long gestation period of 2-3 years and it is not possible to ensure quality through final inspection alone, the concept of involvement of the customer right from the material ordering stage was introduced. This necessitated availability of NTPC inspection personnel right at the manufacturing works on a continuous basis. NTPC fully recognized this aspect and planned NTPC resident inspection offices

at plant locations of the basic power equipment manufacturers such as Bharat Heavy Electrical Limited Works at Hardwar, Bhopal, Hyderabad, Tiruchirapalli, Ranipet, etc. to implement such quality assurance programmes. The organizational structure planned for quality assurance functions to cover all stages of activities was as follows :

* Engineering Quality Assurance Group
* Corporate Quality Assurance Group
* Inspection Group for Inspection and Testing at Manufacturers' works
* Field Quality Assurance Group.

Today NTPC is well known for its quality systems and has brought about a quality consciousness in the power sector in India. Industries in the power sector have also significantly benefited from the quality process of NTPC and were made aware of the technological developments in the world which brought them at par with international standards. In the present scenario of globalisation and liberalisation, focus is now set on quality and speed at optimal costs.

In brief, NTPC has accredited itself commendably as a successful and socially conscious enterprise and is poised to sustain and improve its performance in the future. The main working of NTPC is to generate electricity from coal based thermal power projects and gas/liquid fuel-based combined cycle projects. NTPC sells its power to State Electricity Boards or State Utilities. It also provides consultancy services in the fields of operation and maintenance, construction of power stations etc. and consultancy for Renovation and Modernisation of thermal power stations

of State Electricity Boards. The generation performance of NTPC stations has consistently been at high level. NTPC has accounted for 59 per cent of the total increase in the country's power generation during the year 2000-01 over the generation in the year 1999-2000. The company surpassed all its Memorandum of Understanding targets with the Government of India and achieved Excellent rating for the 14th consecutive year. Apart from this, during the study it is observed that the implementation of project takes too much time and therefore it is required that the effort should be made on continuous reduction of the time taken in project implementation. Short gestation period will ensure the quality of work, economy in expenditure, reduction of interest component in the project cost and other economies of efficiency. Incidently, this would also help in minimising the per unit sale price of energy which will be beneficial for industry, in particular, with its impact on reduction of cost and enhancing India's competitiveness in international markets.

Outstanding dues of NTPC on State Electricity Boards stood at the 19,128.63 crores. It is a critical problem of NTPC as recycling of finance maintains sustainability and also enhance efficiency of the projects. Adequate recovery of these dues from the SEBs are thus, very essential for growth, diversification, expansion, operations and for the success of capacity addition programmes of NTPC. If these dues are recovered from the SEBs, the NTPC can use them to increase further the efficiency of the Corporation.

The ratio of hydro to thermal power has been declining over a period of time. As a result many of the coal based thermal units, designed

to operate as base load stations, are being forced to back down during off peak hours. The urgent need for adding peak load stations coupled with shortage of domestic fuels and concern for environmental pollution has prompted the government to lay thrust on adding hydro stations. This provides an opportunity to NTPC, with a set up of hydro electric power stations, towards the due need of operating hydro to meet peak load demands and thermal for base load. Recently NTPC has diversified into hydel power. NTPC should implement more project of hydel power because main resource of this power is water which is available in abundant quantity in India. Hydel power has certain merits. It is non-polluting and environment friendly.

Machinery is directly related with the efficiency of the Corporation. NTPC have taken over the power project from State Electricity Boards. These project are very old. Machinery used in these stations is also obsolete. It decreases the efficiency of the power plants. For improving the efficiency of power stations, NTPC should use new machinery and equipment. Power plants should not be obsolete and inefficient.

To improve the efficiency, NTPC should undertake Renovation and Modernisation of its old stations.

Operation and maintenance are very important factors to improve the working of the plant. Therefore, it is the need of the hour that the concerned authority should take necessary steps to maintain the plant updated so that the efficiency could be achieved properly.

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CHAPTER - 6

Analysis and Interpretation

CHAPTER – 6

ANALYSIS AND INTERPRETATION

In the preceding chapter, the working of NTPC has been discussed in detail. The discussion highlighted that the NTPC has a sound working management and that it performs a broad spectrum of multifarious functions. Its operations are not only restricted to the sole objective of creation of facilities for power generation but also to extend variegated ancillary assistance to other organisations operating in the power sector of India. This chapter deals with the analysis and interpretation of the working of the NTPC in which financial tools have been taken to measure the financial soundness of NTPC. The financial tools are Capital Employed, Working Capital, Reserve and Surplus, Net Worth as well as by working out Current Ratio, Quick Ratios, Debt-equity Ratio, Net Profit Ratio, Profitability Ratios, etc.

Financially, the NTPC stands out as a strong, sound and successful organisation. It has acquired a dominant position in the thermal power sector. In India, NTPC ranks seventh in terms of sales and second in terms of profit. In the Asia Week Survey for the year 2001, of the top 1000 companies of the Asia Pacific Region including Japan and Australia the NTPC has improved its ranking in terms of sales to 289 from 295 in the previous year.[1] The turnover of NTPC for the year 2000-01 has been of the order Rs. 20,344 crores, mainly due to higher generation. The net fixed assets of the company for the year 2000-1 have been Rs. 18,465.73 crores.[2]

The profitability ratios have been equally impressive. The gross profit (before interest and other fixed charges but after depreciation) have increased from Rs. 4,613.64 crores in 1999-2000 to Rs. 5,165.57 crores in 2000-01. Net profit has also gone up to Rs. 3,733.8 crores, registering an increase of 18.24 per cent and 9.03 per cent respectively over the previous years.

Over the last twenty-five years of the working of the Corporation as a Navratna PSU, has today emerged as one of the largest power utilities in Asia, known for its speedy project execution and operational excellence. With 19.2 per cent of India's operating capacity, the company generates approximatley 26 per cent of country's electricity.[3] The NTPC undoubtedly, dominate the Indian economy by playing an instrumental role in achieving the objectives of economic progress with social justice. It has built up an impressive infrastructure within the short span of time. NTPC is expected to harmonise and implement vigorously the national plan directing and promoting the economic well being of the community.

The analysis of the financial performance of NTPC is based on different parameters viz. profitability, liquidity ratios and analysis of working capital etc. Table 6.1 below presents data concerning the financial position of NTPC for the decade 1990-91 to 2000-01. This table is also represented in the form of bar diagram for a clear understanding at a glance.

TABLE 6.1

FINANCIAL POSITION OF THE NTPC

(Rs. in Crores)

Year	OWNED (A)						OWED (B)					
	Net fixed Assets	Capital work-in-Progress	Invest-ment	Other Expen-diture	Net current Assets	**Total**	Long Term Loan	Short Term Loan	**Total**	Net Worth (A-B)	Equity Capital	Reserve & Surplus
1990-91	8554.59	5603.85	0.02	4.08	1364.11	15526.65	6537.86	191.70	6729.56	8797.09	6355.11	2441.98
1991-92	12034.44	7007.96	0.02	3.88	1204.66	20250.96	9539.40	237.20	9776.60	10474.36	7021.81	3452.55
1992-93	10583.86	6887.02	0.02	4.17	4947.66	22422.73	10177.19	382.51	10559.70	11863.03	7549.84	4340.19
1993-94	11212.03	8079.84	0.02	4.99	4725.90	24022.78	10599.12	91.21	10690.33	13332.45	7999.84	5332.61
1994-95	12459.82	7886.70	0.02	4.68	4549.76	24900.98	10347.39	226.54	10573.93	14327.05	7999.84	6327.21
1995-96	15633.26	4633.10	0.02	2.92	5008.72	25278.02	10200.00	247.59	10447.59	14830.43	7334.97	7495.46
1996-97	17160.61	2545.60	0.07	3.63	6107.26	25817.17	9498.44	174.05	9672.49	16144.68	7403.78	8740.90
1997-98	16866.36	2975.23	86.00	2.68	6878.04	26808.21	8633.94	289.28	8923.22	17884.99	7545.78	10339.21
1998-99	15912.04	4636.52	304.31	4.16	8931.33	29788.36	9422.89	219.58	9642.47	20145.87	7712.55	12433.32
1999-00	17033.51	5055.27	901.59	5.93	9991.49	32987.79	9752.12	325.26	10077.38	22910.41	7812.55	15097.85
2000-01	18465.73	3816.15	3991.46	9.05	9343.13	35625.52	9636.39	168.34	9804.73	25820.79	7812.55	18008.24

Source : Govt. of India, NTPC, Annual Report 1991-92 and 2000-01, New Delhi.

GRAPH- 6.1
GROWTH PROFILE OF FINANCIAL POSITION OF N.T.P.C.

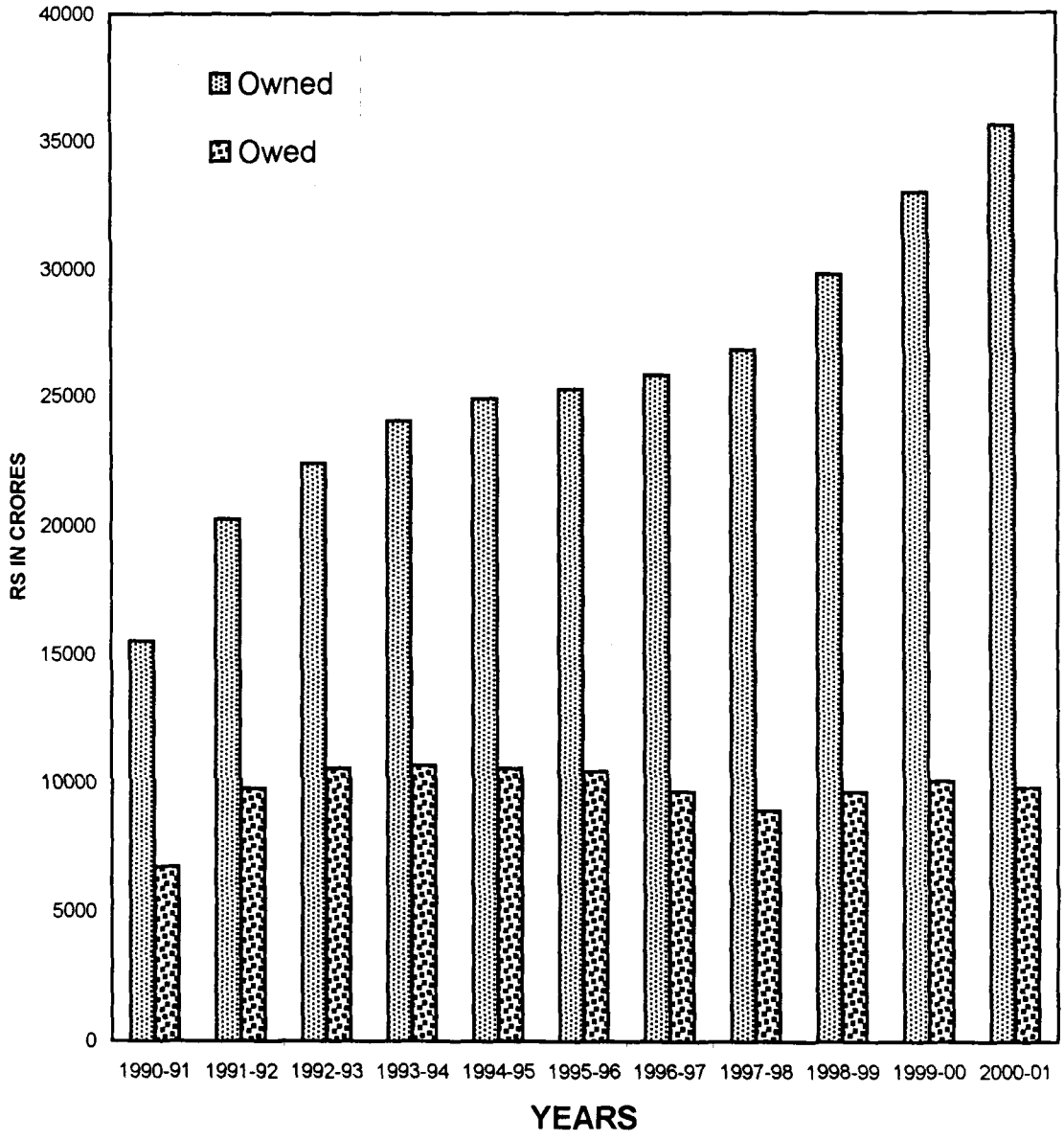


Table 6.1 reveals the sources of funds and their application under different heads of the NTPC. The NTPC has made a considerable investment in net fixed assets which swelled from Rs. 8,554.59 crores in 1990-91 to a record figure of 18,465.73 crores in 2000-01, registering an overall increase of about 115.85 per cent or more than two times during the same period. Similarly, the capital work-in-progress, construction stores and advances decrease from Rs. 5,603.85 crores in 1990-91 to a figure of Rs. 3,816.15 crores in 2000-01, thereby representing an approximate decline of 31.90 per cent during the same period. The investment of NTPC was constant from 1990-91 to 1995-96 at 0.02 crores each year. It increased in subsequent year at a faster pace and from Rs. 0.07 crores in 1996-97 the investment rose to Rs. 86 crores in 1997-98 and further soared to Rs. 304.31 crores in 1998-99, Rs. 901.59 crores in 1999-2000 and stood at Rs. 3,991.46 crores in 2000-01. This is indicative of the growing prowess and success of the NTPC in the power sector of the country. The 'other expenditure' of the Corporation shows a fluctuating trend but on the whole it rose from Rs. 4.08 crores in 1990-91 to Rs. 9.05 crores in 2000-01, thereby representing an approximate hike of about 121.81 per cent or more than 2 times during the same period. The net current assets during the period of 1990-91 were of the value of Rs. 1,364.11 crores and except in the years 1991-92, 1993-94 and 1994-95, they maintain an increasing trend. The value of net current assets was of the order of Rs. 9,343.13 crores during the year 2000-2001. Thermal power is the capital intensive venture and during the initial period of NTPC after its inception, there was only investment in construction and installation of power stations in the form of fixed assets and current assets. Thereafter, the

position of net current assets of the Corporation was strengthened by leaps and bounds, i.e., Rs. 1,364.11 crores in 1990-91 and reached a record figure of Rs. 9,343.13 crores in 2000-2001, indicating an overall rise of about 584.92 per cent or more than 6 times during the same period. The total owned money of NTPC invested in net fixed assets, work-in-progress, investment, other expenditure and net current assets jumped to a figure of Rs. 35,625.52 crores in 2000-2001 as compared to the total owned fund of Rs. 15,526.65 crores in 1990-91 which registered a considerable increase of 129.44 per cent or more than 2.2 times. Likewise, the main source of finance of the Corporation were the long term and short term loans. The long term loan of the NTPC which aggregated to Rs. 6,537.86 crores in 1990-91 rose to a figure of Rs. 9,636.39 crores in 2000-01, registering an overall increase of about 47.39 per cent or more than 1.4 times during the same period. However, the short term loans of the Corporation reveal a fluctuating trend. The short span liabilities decreased from Rs. 191.70 crores in 1990-91 to a figure of Rs. 168.34 crores in 2000-2001, thereby representing an approximate decline of 12.18 per cent. The total owed money against the NTPC in the form of long term and short term loans over a decade shows an insignificant rise of 45.6 per cent or 1.4 times from 1990-91 through 2000-2001. The net worth of the Corporation i.e. difference between total owned and total owed was Rs. 8,797.09 crores in 1990-91 and the same stood at a figure of Rs. 25,820.79 crores in 2000-01, indicating an approximate increase of 193.51 per cent or 2.9 times growth during the decade. This net worth of the NTPC is represented by the amount of equity share capital and reserve and surplus.

Table 6.2 shows the reserve and surplus of the NTPC in different years from 1990-91 to 2000-01. The table also computes the percentage of reserve and surplus to total liability.

TABLE 6.2

RESERVE AND SURPLUS OF NTPC

(Rs. in Crores)

Years	Reserve & Surplus	Liability (Total)	%age of Reserve & Surplus to Total Liability
1990-91	2441.98	6729.56	36.28
1991-92	3452.55	9776.60	35.31
1992-93	4340.19	10532.70	41.20
1993-94	5332.61	10690.33	49.88
1994-95	6327.21	10573.93	59.83
1995-96	7495.46	10447.59	71.74
1996-97	8740.90	9672.49	90.36
1997-98	10339.21	8923.22	115.86
1998-99	12433.32	9642.48	128.94
1999-2K	15097.85	10077.38	149.81
2000-01	18008.24	9804.73	183.66

Source : GOI, NTPC, Annual Report, New Delhi, 2000-01.

Table 6.2 reveals that reserves and surplus amounted to Rs. 2,441.98 crores in 1990-91 against the liability of Rs. 6,729.56 crores for the same period. The percentage of reserve and surplus to total liability account for 36.28. It has been observed from the table that the trends in percentage of

reserves and surplus to total liability has been steadily increasing upto the year 2000-01, except a negligible fall in 1991-92 when the reserves and surplus declined by 0.97 per cent over the previous year. The total reserves and surplus in 2000-01 were of the order of 18,008.24 crores or proportionate to 183.66 per cent of total liabilities as against Rs. 2,441.98 crores in 1990-91 forming 36.28 per cent of the total liabilities. During the entire period of study 1991-92 through 2000-01, the reserve and surplus have increased 6.3 times, whereas the increase in liability is worked out to be 0.45 times. This clearly shows a greater increase in reserve and surplus than the increase in liability of the company during the period under study. This is reflective of the financial soundness and strength of the NTPC.

Working Capital

Working capital has an important bearing on the profitability of an enterprise. It is of two types, the Gross Working Capital and the Net Working Capital. Gross working capital focusses attention on the efficient management of individual current assets in the day-to-day operations of the business. Included in the current assets are short term securities convertible into cash like the bills receivables, debtors and stock (inventories). Net working capital refers to the difference between current assets and current liabilities. Current liabilities are intended to be paid in the ordinary course of business within a short period of normally one accounting year out of the current assets or the income of the business and includes bills payable, creditors, outstanding expenses, loans deposits, bank overdraft etc. The following formula help to calculate the working capital.

Working Capital = Current Assets - Current Liabilities

It may be said that both gross and net concepts of working capital are important aspects of the working capital management. They are not mutually exclusive, rather, they have equal significance from the point of view of the management. The need for working capital, by a firm in the normal course of business cannot be over emphasised. Firms may differ in the requirements of working capital but no firm can do without it.

The working capital cycle involves converting inventories into cash with the intervening stage being that of receivables. The management of the firm is concerned with increasing the velocity of this flow (turnover) so that the same resources may become more productive.

While analysing a firm's financial strength it is important to examine its net working position. Table 6.3 computes the working capital of the Corporation between 1990-91 and 2000-01.

TABLE 6.3

WORKING CAPITAL OF NTPC

(Rs. in Crores)

Years	Current Assets	Current Liabilities	Working capital (CA-CL)
1990-91	2879.90	1515.79	1364.11
1991-92	3449.44	2244.78	1204.66
1992-93	7310.58	2362.92	4947.66
1993-94	6874.95	2149.05	4725.90
1994-95	7143.09	2593.33	4549.76

Contd...

1995-96	6712.57	1703.85	5008.72
1996-97	8150.06	2042.80	6107.26
1997-98	10681.27	3803.23	6878.04
1998-99	14595.09	5663.76	8931.33
1999-2K	17180.85	7189.36	9991.49
2000-01	16075.56	6732.43	9343.13

Source : Govt. of India, NTPC Annual Report, New Delhi, 2000-01.

It is borne out from Table 6.3 that the total current assets of NTPC amounted to Rs. 2,879.90 crores in 1990-91. Over the decade under review they rose in value to Rs. 16,075.56 crores in 2000-01 recording a massive increase of nearly 458.19 per cent or more than 5.6 times. The current liabilities of the NTPC for the corresponding period grew from Rs. 1,515.79 crores in 1990-91 to Rs. 6,732.43 crores in 2000-01, thereby representing an overall rise of around 344.15 per cent or 4.44 times more. The working capital employed in the year 1990-91 was Rs. 1,364.11 crores which increased to Rs. 9,343.13 crores in 2000-01, accouting for an overall rise of 584.92 per cent or more than 6.84 times during the decade. The increases in working capital however marked with fluctuations. The working capital slumped down to Rs. 1,204.66 crores in 1991-92 as against Rs. 1,364.11 crores in the previous year. During the year 1992-93, the working capital rose to a record figure of Rs. 4,947.66 crores. In the subsequent year however, it dropped to Rs. 4,725.90 crores in 1993-94 and further decreased to Rs. 4,549.76 crores in 1994-95. Constant increases in the amount of working capital are witnessed onwards. The working capital of NTPC which was Rs. 5,008.72 crores in 1995-96 rose steadily to a figure of Rs. 9,991.49

crores in 1999-2K. The overall hike in the amount of working capital from Rs. 1,364.11 crores in 1990-91 to Rs. 9,343.13 crores in 2000-01 works out to 584.92 per cent indicating that the NTPC's working capital multiplied six fold during the decade under study. This increase is, however, quite phenomenal by any standard. This proves that the NTPC has been efficiently utilizing its working capital.

Table 6.4 presents an account of the variation in the capital employed by the Corporation.

TABLE 6.4

CAPITAL EMPLOYED BY NTPC

(Rs. in Crores)

Years	Net Fixed Assets	Capital Employed	Growth (%)
1990-91	8554.59	10278.63	-
1991-92	12034.44	13804.94	34.30
1992-93	10583.86	13012.57	5.73
1993-94	11212.03	13952.72	7.22
1994-95	12459.82	14809.10	6.13
1995-96	15633.26	18198.66	22.88
1996-97	17160.61	21957.03	20.65
1997-98	16866.36	25252.69	15.00
1998-99	15912.04	27158.09	7.54
1999-2K	17033.51	29760.38	9.58
2000-01	18465.73	33045.15	11.03

Source : Govt. of India, NTPC Annual Report, New Delhi, 2000-01.

Table 6.4 shows the values of capital employed in different years from 1990-91 to 2000-01. The table also computes the percentage increases/ decreases in the value of capital over the previous years. It is evident that capital employed since 1990-91 to 2000-01 presents a rising trend throughout the period. As a matter of fact capital employed implies net fixed assets excluding the capital works in progress plus working capital.[4] The net fixed assets of NTPC which were of Rs. 8,554.59 crores in 1990-91 jumped to Rs. 18,465.73 crores in 2000-01 registering a rise of around 115.85 per cent or 2.16 times. Likewise the capital employed has considerably gone up from Rs. 10,278.63 crores in 1990-91 to Rs. 33,045.15 crores in 2000-01, indicating an overall increase of about 221.49 per cent or 3.21 times rise during the period. Moreover, the growth in capital employed has been steady and constant throughout the period except a marginal fall in the year 1992-93. The trend in yearly percentage increases or decreases is, however, fluctuating but remained positive over the period 1990-91 to 2000-01under review. Thus, the overall analysis clearly indicates that the capital employed in NTPC has multiplied and risen phenomenally during the period under review.

The net worth for the present study comprises of the paid up capital plus reserve and surplus. Table 6.5 shows the analysis of net worth of NTPC. The table also computes the yearly growth percentages on the basis of the previous years.

TABLE 6.5

NET WORTH OF NTPC

Years	Paid up Capital	Reserves & Surplus	Net Worth	Growth (%)
1990-91	6355.11	2441.98	8797.09	-
1991-92	7021.81	3452.55	10474.36	19.06
1992-93	7549.84	4340.19	11890.03	13.51
1993-94	7999.84	5332.61	13332.45	12.13
1994-95	7999.84	6392.21	14327.05	7.45
1995-96	6613.58	7495.45	14830.43	3.51
1996-97	7403.78	8740.90	16144.68	8.86
1997-98	7545.78	10339.21	17884.99	10.77
1998-99	7712.55	12433.32	20145.87	12.64
1999-2K	7812.55	15097.85	22910.40	13.72
2000-01	7812.55	18008.24	25820.79	12.70

Source : Govt. of India, NTPC Annual Report, New Delhi, 2000-01.

It is found from the above table 6.5 that the net worth of the NTPC during the period under study has been consistently increasing. The paid up capital which was Rs. 6,355.11 crores in 1990-91 swelled to Rs. 7,812.55 crores in 2000-01 which represented an increase of around 23 per cent or 1.22 times more over this period. Similarly, the reserves and surplus of the Corporation grew by leaps and bounds during the corresponding period. From Rs. 2,441.98 crores in 1990-91 the reserves and surplus rose to Rs. 18,008.24 crores in 2000-01, making a considerable increase of around 637 per cent or 7.37 times more. The net worth of the company increased from

Rs. 8,797.09 crores in 1990-91 to Rs. 25,820.79 crores in 2000-01, thereby registering an overall growth of around 194 per cent or more than three times during the period under study.

The analysis of the yearly growth of net worth of the NTPC reflects a fluctuating trend in positive terms. In the year 1991-92, the growth in net worth over the previous year has been the highest at 19.06 per cent. During the year 1995-96, 3.51 is the lowest growth in net worth. Overall the net worth of the NTPC is indicative of the fact that the Corporation has been considerably fairing well in maintaining the consistent growth of net worth during the period under review.

Ratio Analysis

The ratio analysis is the most powerful tool of financial analysis. It is used as a device to analyse and interpret the financial health of the enterprise. Ratio analysis is the process of determining and interpreting numerical relationships based on financial statements. A ratio is a simple arithmetical expression of the relationship of one number to another. In simple language ratio is one number expressed in terms of another and can be worked out by dividing one number into the other. A ratio can also be expressed as a statistical yardstick that provides a measure of the relationship between variables. Ratios should also be such that there is casual relationship between the numerator and the denominator[5]. This relationship can be expressed as per cent e.g. cost of goods sold as percentage of sales or as a quotient e.g. current assets as a certain number of times the current liabilities. A ratios are simple to calculate and easy to

understand, there is a tendency to over employ them. While such statistical calculation stimulate thinking and develop understanding, there is a danger of accumulation of a mass of data that obscures rather than clarifies relationships. The financial analyst has to steer a careful courses. This experience and objectives of analysis held in determining ratios which are of relevance in a given context.

Analysis of financial statements can be grouped under three heads :

(1) Owners or Investors

(2) Creditors, and

(3) Financial Executive.

Although all three groups are interested in the financial condition and operating results of an enterprise, yet the primary information that each seeks to obtain from these statements differs materially, reflecting the purpose the statement is to serve.

Investors who desire primarily a basis for estimating the earning capacity of the firm's creditors (trade and financial) are concerned with the liquidity position of the firm and its ability to pay interest and redeem loans within a specified period. The management is interested in evolving analytical tools that will measure cost, efficiency, liquidity and profitability with a view to making intelligent decisions. The ratios calculated, can be broadly categorised into the following groups :

1. Liquidity Ratios
2. Leverage Ratios
3. Profitability Ratios

RATIOS OF THE N.T.P.C.

(1) Liquidity Ratios

Liquidity in a business is the potential ability to meet current obligations. The liquidity ratios, therefore, try to establish a relationship between current liabilities, which are the obligations soon becoming due and current assets, which presumably provide the source from which these obligations will be met. The failure of a company to meet its obligations due to lack of adequate liquidity will result in bad credit ratings, loss of creditor's confidence or even in law suits against the company. The following ratios are commonly used to indicate the liquidity of business.

a) Current Ratio (Working Capital Ratio)

b) Quick Ratio (Acid Test Ratio).

a) Current Ratio

Current ratio may be defined as the relationship between current assets and current liabilities. This ratio, also known as working capital ratio, is a measure of general liquidity and is most widely used to make the analysis of a short term financial position or liquidity of a firm. It is calculated by dividing the total of the current assets by the total of the current liabilities.[6]

$$\text{Current Ratio} = \frac{\text{Current Assets}}{\text{Current Liabilities}}$$

Current assets include cash and those assets which can be easily converted into cash within a short period of time generally, one year. Current liabilities are those obligations which are payable within a short period of

generally one year and include outstanding expenses, bills payable, sundry creditors, accrued expenses, short term advances, income tax payable, dividend etc. Thus, it is an indication of the ability of an enterprise in regard to meeting current liabilities. The significance of the current ratio is that it is not only a measure of solvency but it is an index of the working capital available to the enterprise.

Table 6.6 shows the amount of current assets, current liabilities and current ratio of the Corporation between 1990-91 and 2000-01. The current assets and current liabilities of the NTPC are also represented in the form of graph.

TABLE 6.6

CURRENT RATIOS OF NTPC

(Rs. in Crores)

Years	Current Assets	Current Liabilities	Current ratio (times)
1990-91	2879.90	1515.79	1.89 : 1
1991-92	3449.44	2244.78	1.53 : 1
1992-93	7310.58	2362.92	3.09 : 1
1993-94	6874.95	2149.05	3.19 : 1
1994-95	7143.09	2593.33	2.75 : 1
1995-96	6712.57	1703.85	3.93 : 1
1996-97	8150.06	2042.80	3.98 : 1
1997-98	10681.27	3803.23	2.80 : 1
1998-99	14595.09	5663.76	2.57 : 1
1999-2K	17180.85	7189.36	2.39 : 1
2000-01	16075.56	6732.43	2.38 : 1
Average	9186.66	3454.66	2.66

Source : Govt. of India, NTPC Annual Report, New Delhi, 2000-01.

GRAPH-6.2
GROWTH PROFILE OF CURRENT ASSETS AND CURRENT LIABILITIES OF N.T.P.C

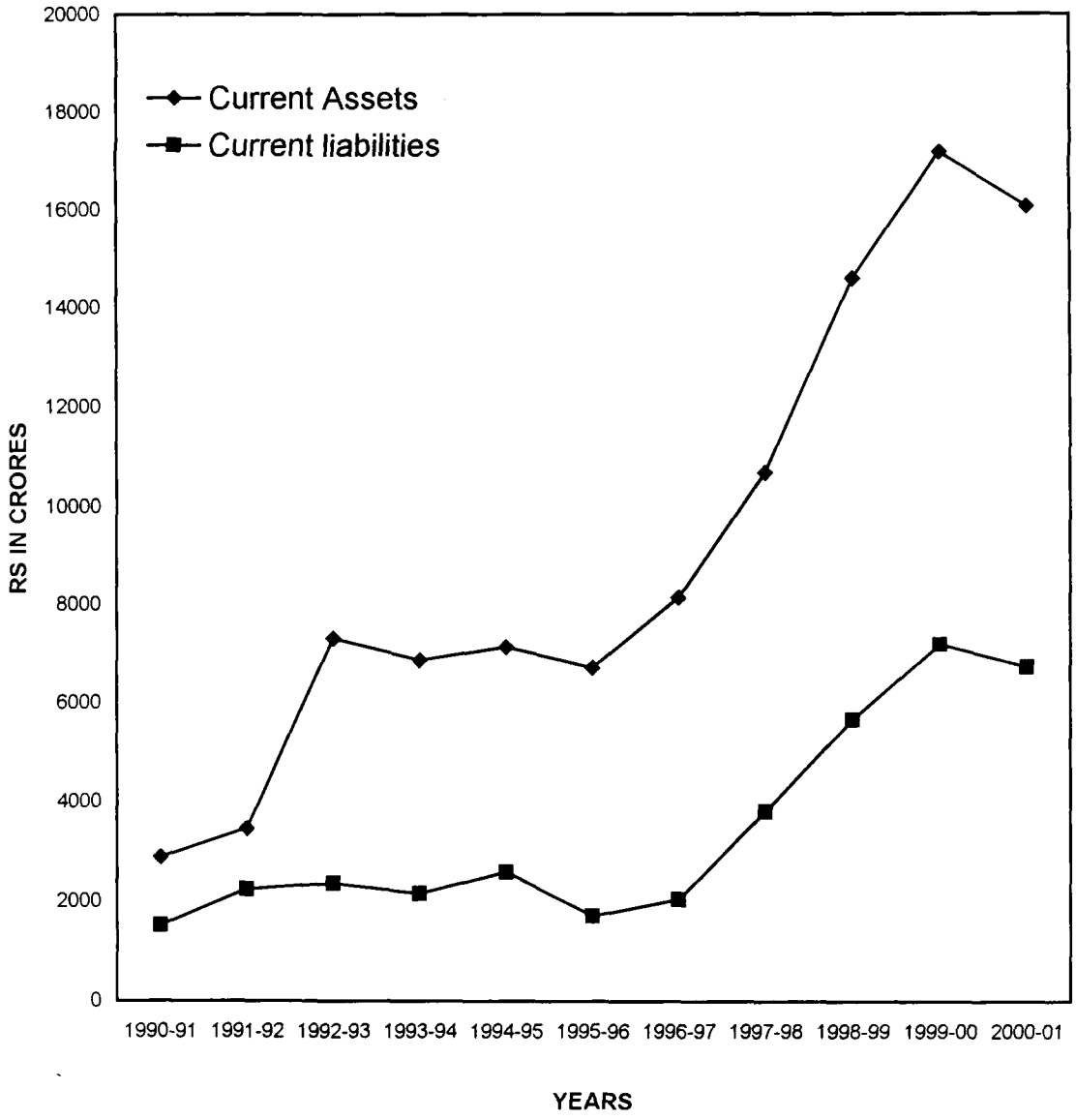


Table 6.6 indicates that the total current assets of NTPC increased tremendously from Rs. 2,879.90 crores in 1990-91 to Rs. 16,075.56 crores in 2000-01 registering a growth rate of around 458.19 per cent or more than five times in a span of a decade. Similarly, the amount of total current liabilities rose from Rs. 1,515.79 crores in 1990-91 to Rs. 6,732.43 crores in 2000-01, yielding an overall increase of about 344.15 per cent or more than four times during the corresponding period. It is evident from the table that there has been wavering trend of growth in the current ratio of the NTPC for the period under review. The mean of current assets and current liabilities were Rs. 9,186.66 crores and Rs. 3,454.66 crores respectively. In 1990-91 the current ratio was 1.89:1 which increased to 1.53:1 in 1991-92 and further to 3.09:1 in 1992-93. In 1993-94 the current ratio was 3.19:1 but decreased to 2.75:1 in 1994-95. From 1995-96 it again started picking up. From 3.93:1 in 1994-95 it increased to 3.98:1 in 1996-97. In 1997-98 it declined to 2.80:1 and further declined to 2.38:1 in 2000-01. The ratio of current assets to current liabilities edged down to 2.38:1 times in 2000-01 which means that during this year the NTPC had worth Rs. 2.38 of current assets for every rupee of current liabilities. As a conventional rule a current ratio of 2:1 (i.e., current assets of current liabilities) or more is considered to be a satisfactory measure of the liquidity of the firm. The ratio crossed the norm of 2:1 in nine years out of eleven under study which could be considered a better working capital position because it was past to norm. In fact in two years, viz. 1990-91 and 1991-92 there was no cover to the current creditors as their contribution exceeded the investment in the current assets. It is because of the fact that there was a working capital deficit in these two years.

(b) Quick ratio

The term quick ratio may be defined as the relationship between quick liquid assets and current or liquid liabilities. The quick ratio reveals the liquidity position of a corporation. It measures the firm's capacity to pay off current obligations immediately and is a more rigorous test of liquidity than the current ratio. Its role is complimentary to the current ratio.

$$\text{Quick Ratio} = \frac{\text{Current Assets - Inventories}}{\text{Current Liabilities}}$$

For computing this ratio only liquid assets (Current Assets - Inventories) and current liabilities are taken into account. The current assets, inventories, current liabilities and quick ratio in respect of NTPC have been presented in table 6.7. The liquidity position of the NTPC has been depicted in the form of graph also.

TABLE 6.7

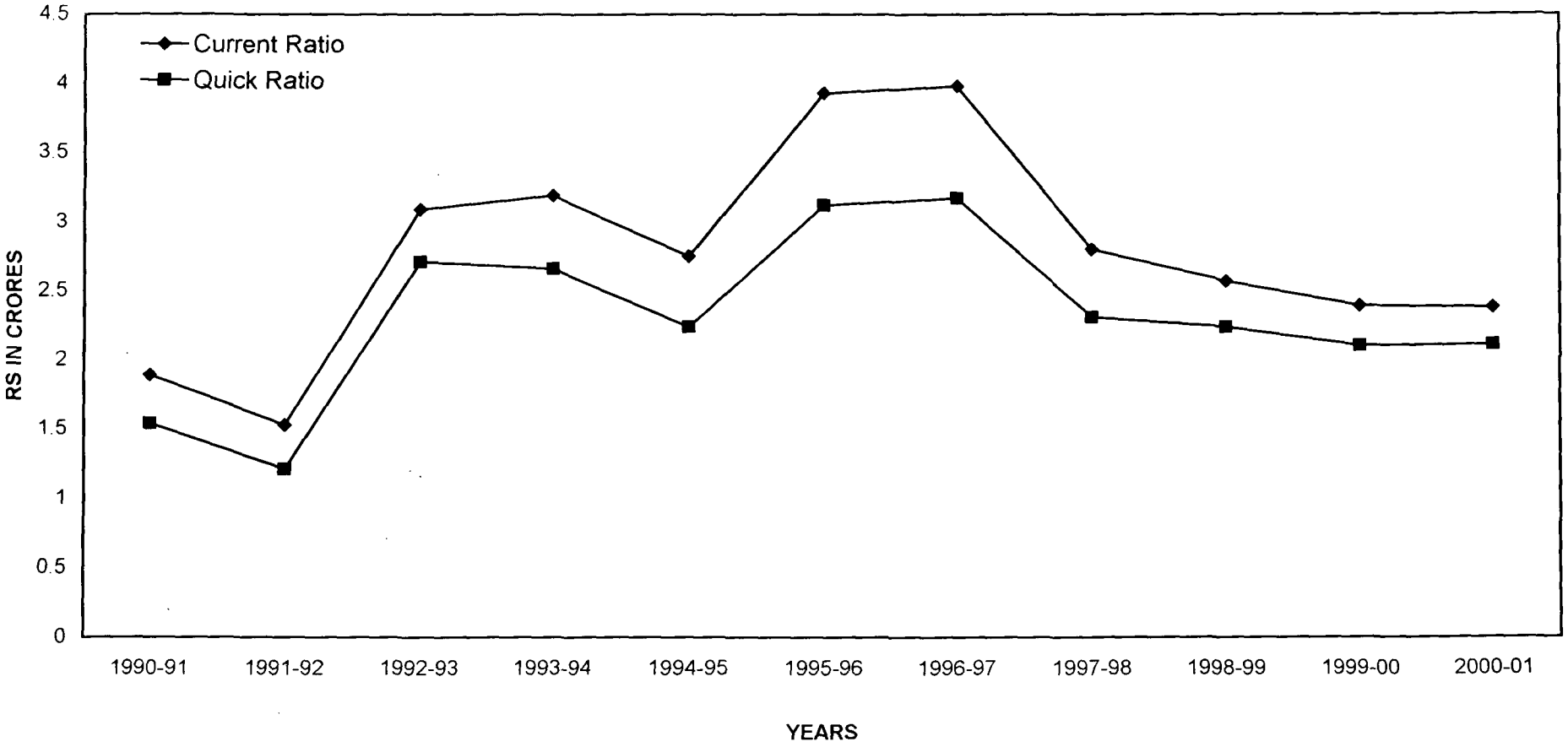
QUICK RATIO

(Rs. in Crores)

Years	Current Assets	Inventories	Quick Assets	Current Liabilities	Quick Ratio (%)
1990-91	2387.90	541.36	2338.54	1515.79	1.54:1
1991-92	3449.44	730.63	2718.81	2244.78	1.21:1
1992-93	7310.58	903.70	6406.88	2362.92	2.71:1
1993-94	6874.95	1140.16	5734.79	2149.05	2.66:1
1994-95	7143.09	1331.09	5812.00	2593.33	2.24:1
1995-96	6712.57	1387.20	5325.37	1703.85	3.12:1
1996-97	8150.06	1669.99	6480.07	2042.80	3.17:1
1997-98	10681.27	1884.45	8796.82	3803.23	2.31:1
1998-99	14595.09	1873.34	12721.75	5663.76	2.24:1
1999-2K	17180.85	2022.69	15158.16	7189.36	2.10:1
2000-01	16075.56	1835.61	14239.95	6732.43	2.11:1
Average			7793.92	3454.66	2.25

Source : Govt. of India, NTPC Annual Report, New Delhi, 2000-01.

GRAPH-6.3
LIQUIDITY POSITION OF N.T.P.C



It is evident from the table that the value of total assets increased from Rs. 2,338.54 crores in 1990-91 to Rs. 14,239.95 crores in 2000-01, showing an overall increase of 508.92 per cent or more than six times. Similarly the amount of current liabilities rose from Rs. 1,515.79 crores in 1990-91 to Rs. 6,732.43 crores in 2000-01, recording an overall increase of roughly 3.44 per cent or more than four times. The mean of quick assets and current liabilities was Rs. 7,793.92 crores and Rs. 3,454.66 crores respectively. The quick assets and current liabilities both indicate an increasing trend but the rate of increase of quick assets is higher than that of the current liabilities. The quick ratio rose from 1.54 times in 1990-91 to 2.71 times in 1992-93. After declining to 2.24 times in 1994-95 it again advanced to 3.12 times in 1995-96. In the year 1996-97 it was further higher at 3.17 times. However, it dropped from 2.31 times in 1997-98 to 2.10 times in 1999-2000. It shot up in the subsequent year to 2.11 times in 2000-01. The range of variation of quick ratio is 1.21 times to 3.17 times.

The most accepted norm for the quick ratio usually contemplated to be adequate is 1:1. The quick ratio of NTPC had been higher than the norm of 1:1. From the 1990-91 to 2000-01 the quick ratio was within the accepted parameter, that is 1:1. This is an indicator of constantly higher standard of efficiency maintained by the NTPC during the period under review.

(2) Leverage Ratios

The leverage/capital structure ratios highlight the relationship between the various long term forms of financing such as debentures (long term), preference share capital and equity share capital including reserves

and surplus.[7] Financing the firm's assets is a very crucial problem in every business and as a general rule there should be a proper mix of debt and equity capital in financing firm's assets. Capital structure ratios are calculated to test the long term financial position of a firm. These ratios provide evidence on (i) the extent to which non equity capital is used in a firm and (ii) the long run ability of a firm to meet payments to non equity supplies of capital. The ratios calculated in this category include :

(a) Debt-equity ratio = $\frac{\text{Long term debt}}{\text{Shareholders equity}}$

(b) Debt to total capitalization

(c) Net worth to fixed assets + capital works in progress.

(d) Fixed assets + capital works is progress to total capital employed.

Table 6.8 shows the debt-equity ratio of NTPC from 1990-91 to 2000-01.

TABLE 6.8

DEBT-EQUITY RATIO

(Rs. in Crores)

Years	Outsiders' Fund	Shareholders' Fund	Debt-Equity Ratio (time)
1990-91	6729.56	8797.09	0.76:1
1991-92	9676.60	10474.36	0.92:1
1992-93	10512.71	11890.03	0.88:1
1993-94	10690.33	13332.45	0.80:1
1994-95	10573.93	14327.05	0.74:1
1995-96	10251.37	14830.43	0.69:1

Contd...

1996-97	9672.50	16144.68	0.60:1
1997-98	8923.22	17884.99	0.50:1
1998-99	9642.48	20145.87	0.48:1
1999-2K	10077.38	22910.40	0.44:1
2000-01	9804.73	25820.79	0.38:1
Average	9686.80	16050.74	0.60:1

Source : Govt. of India, NTPC Annual Report, New Delhi, 2000-01.

Table 6.8 reflects that outsiders' fund which stood at Rs. 6,729.56 crores in 1990-91 rose to a figure of Rs. 9,804.73 crores in 2000-01 which recorded a massive growth of nearly 45.7 per cent. The share of shareholders contribution in the finances of NTPC increased tremendously. The volume of shareholders fund was Rs. 8,797.09 crores in 1990-91 and it got enlarged to Rs. 25,820.79 crores in 2000-01, indicating an overall increase of around 193.5 per cent or 2.9 times more during the same period. The mean of outsider's and owner's fund was Rs. 9,686.80 crores and Rs. 16,050.74 crores respectively. The debt equity ratio were 0.76:1, 0.92:1, 0.88:1 and 0.80 in 1990-91, 1991-92, 1992-93 and 1993-94, which were satisfactory because they were in the close proximity of the normal 1:1 in all these years. In each of the subsequent years, however, the debt equity ratios were not satisfactory because they were below the desirable 1:1. The debt-equity ratio of 1:1 is generally indicative of the fact that the financial position of the organisation is satisfactory. A ratio lower than 1:1 in the years 1994-95 to 2000-01 reflected that the share of equities financing has been more during these years.

(3) Profitability Ratios

Measure of profitability is the overall measure of efficiency. The primary objective of a business undertaking is to earn profits as it is considered essential for the survival of the business. The business needs profit not only for its existence but also for expansion and diversification. The investors want an adequate return on their investments, workers want higher wages, creditors want higher security for their loan and interest and so on. A business enterprise can discharge its obligations to the various segments of the society only through earning of profits. Profitability ratios are calculated to measures the overall efficiency of the business.[8] It also shows the ability of a firm to generate revenue in excess of expenses. The data presented in table 6.9 depicts the profitability profile of the Corporation.

TABLE 6.9

PROFITABILITY PROFILE OF NTPC

(Rs. in Crores)

Year	Capital Employed	Gross Margin (surplus before depreciation interest & tax)	Depre-ciation	Gross Profit	Interest & Finance charges	Net Profit	Percentage of gross margin to capital employed	Percentage of gross profit to capital employed	Percentage of net profit to capital employed
1	2	3	4	5	6	7	8	9	10
1990-91	10278 63	1273 29	225 13	1048 16	347 21	700 95	12 38	10 19	6 81
1991-92	13804 94	1933 84	362 51	1571 33	564 27	1007 06	14 00	11 38	7 29
1992-93	13012 57	1961 09	517 96	1443 13	556 27	886 57	15 07	11 09	6 82
1993-94	13952 72	2326 04	661 22	1664 82	606 82	1057 97	16 67	11 93	7 58
1994-95	14809 10	2584 31	772 17	1812 14	687 47	1124 55	17 45	12 23	7 59
1995-96	18198 66	3463 48	1161 46	2302 02	949 29	1352 61	19 03	12 64	7 43
1996-97	21957 03	4288 36	1472 55	2815 81	1093 02	1679 43	19 53	12 84	7 64
1997-98	25252 69	5403 67	1744 41	3659 26	1386 01	2153 50	21 39	14 49	8 52
1998-99	27158 09	5985 42	1986 38	3999 04	1082 96	2815 73	22 03	14 72	10 36
1999-00	29760 38	6696 75	2083 11	4613 64	982 76	3424 53	22 50	15 50	11 50
2000-01	33045 15	7487 90	2322 34	5165 57	1091 76	3733 80	22 65	15 63	11 29

Source Govt of India, NTPC, Annual Report, New Delhi

The operational efficiency of the NTPC during 1990-91 and 2000-2001 is evident from table 6.9. The capital employed by the NTPC was Rs. 10,278.63 crores in 1990-91 and it rose to a figure of Rs. 33,045.15 crores in 2000-2001 registering a significant growth of nearly 221.4 per cent or 3.21 times more during the same period. The surplus before depreciation, interest and taxes maintained an increasing trend. Gross margin was Rs. 1,273.29 crores in 1990-91. After liberalisation the gross margin increased to a record figure of Rs. 7,487.90 crores in 2000-01, indicating an overall increase of roughly 488 per cent or more than 5.8 times during the period under review. To maintain the ratio of profit, the NTPC has been providing for depreciation reserves which has increased by leaps and bounds, i.e., from Rs. 225.13 crores in 1990-91 to Rs. 2,322.34 crores in 2000-01, thereby showing a significant rise of around 10.3 times more. The impact of growing needs for reserve has depressed the gross profit after depreciation. The gross profit of the NTPC went up considerably from Rs. 1,048.16 crores in 1990-91 to Rs. 5,165.57 crores in 2000-01, making an increase of about 392.8 per cent or more than 4.9 times during the period under reference. The gross profit was decreased by 43.5 per cent on an average in comparison to gross margin during the period under review. Lower rate of gross profit after depreciation is accounted for by depreciation reserves at a greater rate than the rate of growth in profit. The another provision which the NTPC makes is related to interest and finance charges. There is steadily mounting pressure of interest on the Corporation. The interest obligation of Rs. 347.21 crores in 1990-91 increased to a substantial amount of Rs. 1,091.76 crores in 2000-01. The interest and finance charges registered an approximate rise

of roughly 214.4 per cent or 3.14 times more during the same period. The net profit of the NTPC has been steadily increasing over the period barring the year 1992-93 when the profit dipped as compared to the previous year. From Rs. 700.95 crores in 1990-91 the net profits of NTPC rose to Rs. 3,733.80 crores in 2000-01, thereby representing a tremendous increase of around 432.6 per cent or 5.3 times. The cumulative effect of interest and depreciation is indicated by relative figures for percentage of gross profit to capital employed before depreciation, gross profit to capital employed after depreciation and net profit after interest. From the above analysis of data in the table, it is apparent that the NTPC is amongst the best profit making public sector undertaking in the country.

(4) Net Profit Ratio

Net profit ratio or net profit margin is the ratio of net profit to net sales and indicates that portion of sales which is left to the owners after all costs have been met. It differs from the operating profit ratio in as much as it is calculated after deducting non-operating expense (like loss on the sale of old asset) and adding non-operating incomes like interest, dividend etc. in the operating profit. This ratio measures the overall profitability of a company. It indicates a company's capacity to withstand adverse economic conditions. A company with a high net profit ratio is in a better position to survive the conditions of falling selling prices and rising cost of production. A company with a low ratio, on the other hand, may not be able to withstand such adverse conditions. The net profit ratio is worked out as follows :

$$\text{Net Profit Ratio} = \frac{\text{Net Profit After Taxes}}{\text{Net Sales}} \times 100$$

The net profit ratio thus worked out also helps in the assessment of management's ability to operate the business with sufficient success not only to recover costs from revenues of the period, but also to leave a margin of reasonable compensation to the owners for providing return on their capital at risk. The amount of net profit and sale of energy of NTPC from 1990-91 to 2000-01, are presented in table 6.10 below.

TABLE 6.10

NET PROFIT RATIO

(Rs. in Crores)

Years	Net Profit	Sale of Energy	Net Profit Ratio (%)
1990-91	700.95	2400.59	29.19
1991-92	1007.06	3854.43	26.12
1992-93	886.57	4485.36	19.76
1993-94	1057.97	5918.33	17.87
1994-95	1124.55	6359.84	17.68
1995-96	1352.61	8344.19	16.21
1996-97	1679.43	9839.65	17.06
1997-98	2153.50	12412.57	17.35
1998-99	2815.73	14057.37	20.03
1999-2K	3424.53	16101.75	21.26
2000-01	3733.80	19045.14	19.60

Source : Govt. of India, NTPC Annual Report, New Delhi, 2000-01.

The data in table 6.10 above bring to fore that the net profit of the NTPC multiplied five fold over the period 1990-91 to 2000-01. From Rs. 700.95 crores in 1990-91 the net profits rose to Rs. 3,733.80 crores in 2000-01, thereby representing an overall increase of over 432.6 per cent. Similarly, the sales of energy to various State Electricity Boards rose from Rs. 2,400.59 crores in 1990-91 to Rs. 1,9045.14 crores in 2000-01, registering a significant improvement of about 693.35 per cent or more than 7.9 times. The average of net profit and sales of NTPC was Rs. 1,812.42 crores and Rs. 9,347.20 crores respectively. From the above table, it is clear that the amount of net profit has been increasing from 1990-91 to 2000-01 except in the year of 1992-93. Sales of NTPC has consistently been increasing during the years under review.The trend of net profit ratio shows increases but is punctuated by marginal decreases here and there. The data in table 6.10 also reflects that the growth rate of net profit is higher than the growth rate of sales.

The net profit profit before tax and after tax have been presented in the table 6.11 :

TABLE 6.11

GROWTH OF PROFIT BEFORE TAX AND PROFIT AFTER TAX

(Rs. in Crores)

Years	Profit Before Tax	Profit Before Tax — % incr./decr. over the previous year	Profit After Tax	Profit After Tax — % incr./decr. over the previous year
1990-91	700.95	-	700.95	-
1991-92	1007.06	43.67	1007.06	43.67
1992-93	886.86	-11.93	886.57	-11.93
1993-94	1058.00	19.29	1057.97	19.33
1994-95	1124.67	6.30	1124.55	6.29
1995-96	1352.73	20.27	1352.61	20.28
1996-97	1722.78	27.35	1679.43	24.16
1997-98	2273.25	31.95	2153.50	28.22
1998-99	2916.08	28.27	2815.73	30.75
1999-2K	3630.88	24.51	3424.53	21.62
2000-01	4073.81	12.19	3733.80	9.03
Overall % incr./decr. during the period from 1990-91 to 2000-01		481.18		432.67
Average	1886.09		1812.42	

Source : Govt. of India, NTPC, Annual Report, New Delhi, 2000-01.

Table 6.11 shows the growth of profit before tax and profit after tax in terms of rupees in crores from 1990-91 to 2000-01. During 1990-91, the profit before tax was Rs. 700.95 crores, which increased in 1991-92 to Rs. 1,007.06 crores, a rise of 43.67 per cent, over the previous year. In 1991-92 the profit before tax was Rs. 1,007.06 crores which declined in 1992-93 by Rs. 886.86 crores, a decrease by 11.93 per cent over the previous year. The profits picked up in the following year and the amount of profit before tax

went up from Rs. 886.86 in 1992-93 to Rs.1,058 crores in 1993-94, a rise by 19.29 per cent over the previous year. Again from 1993-94 to 1994-95 the profit before tax rose from Rs. 1,058 to Rs. 1,124.67 crores, an increase of 6.30 per cent over the previous year. In the year 1995-96 profit before tax further increased to Rs. 1,352.73 crores, yielding a rise of 20.27 per cent over the previous year. The uptrend in profits continued and the profit before tax went up from Rs. 1,352.73 in 1995-96 to Rs. 1,722.78 crores in 1996-97, a rise by 27.35 per cent over the previous year. The profits before tax were Rs. 2,273.25 crores, in 1997-98 showing an increase of 31.95 per cent over the previous year. Again from 1997-98 to 1998-99, the profit before tax went up from Rs. 2,273.25 to Rs. 2,916.08 crores, registering an increase of 28.27 per cent over the previous year. From 1998-99 to 1999-2000 the profit before tax rose from Rs.2,916.08 to Rs. 3,630.88 crores, or by 24.51 per cent over the previous year. During 1999-2000 to 2000-01 the profit before tax increased from Rs. 3,630.88 to Rs. 4,073.81 crores, an increase by 12.19 per cent over the previous year. The overall increase in profit before tax of NTPC from 1990-91 to 2000-01 has been 481.18 per cent or more than 5.8 times.

Growth in Profit After Tax :

The growth of profit after tax from 1990-91 to 2000-01 is also evident from table 6.11. It appears from the data that 1990-91 and 1991-92 are tax free years. However, in 1990-91 the profit which was Rs. 700.95 crores went up in 1991-92 to Rs. 1,007.06 crores, the increase being 43.67 per cent over the previous year. From 1991-92 to 1992-93, the profit after tax declined from Rs.1,007.06 to Rs. 886.57 crores, or by 11.93 per cent

over the previous year. From 1992-93 to 1993-94, the situation slightly improved and the profit after tax increased from Rs. 886.57 to Rs. 1,057.97 crores, a rise by 19.33 per cent over the previous year. In 1993-94 the profit after tax were Rs. 1,057.97 crores as against Rs. 1,124.55 crores in 1994-95, a rise of 6.29 per cent over the previous year. Again from 1994-95 to 1995-96 the profit after tax went up from Rs.1,124.55 to Rs. 1,352.61 crores accounting for a rise of 20.28 per cent over the previous year. From 1995-96 to 1996-97 the profit after tax rose from Rs. 1,352.61 to Rs. 1,679.43 crores, the increase being 24.16 per cent over the previous year. From 1996-97 to 1997-98 the profit after tax further rose from Rs. 1,679.43 to Rs. 2,153.50 crores at a rate of 28.22 per cent over the previous year. In the same manner from 1997-98 to 1998-99 the growth of profit after tax from Rs. 2,153.50 to Rs.2,815.73 crores, has been 30.75 per cent over the previous year.

From 1998-99 to 1999-2000 the profit after tax were further up from Rs. 2,815.73 to Rs. 3,424.53 crores, or by 21.62 per cent over the previous year. From 1999-2000 to 2000-01 the profit after tax maintained the rising trend and from Rs. 3,424.53 rose to Rs. 3,733.80 crores, accounting for a rise by 9.03 per cent over the previous year. The overall increase in the profit after tax from 1990-91 to 2000-01 has been 432.67 per cent or more than 5 times. The mean of profit before tax and profit after tax was Rs. 1,886.09 and Rs. 1,812.42 crores respectively. Thus, NTPC has maintained its steady financial growth. It also continued to maintain sound financial position and high level of operational and financial efficiency during 2000-01 and hopes to do even better in the years to come.

From the foregoing analysis it is concluded that the overall financial performance of NTPC has been extremely satisfactory. The NTPC has undertaken the challenge to provide power directly to the State Electricity Boards with improved efficiency in operation and better utilisation of available capacity. Among the factors which are responsible for extensive growth of the Corporation, the most important are financial. The study of the financial performance of NTPC in the country for a period from 1990-91 to 2000-01 has revealed that the Corporation is quite sound on the financial front.

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CHAPTER - 7

Conclusion and Suggestions

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CONCLUSION AND SUGGESTIONS

Power constitutes important segment of the infrastructure. It has been termed as the fuel of economic progress and the prime mover of economic growth and development. Throughout the history of human race, major advances in civilisation have been accompanied by an increased consumption of power. The rate of growth of any economy is directly linked with the availability and consumption of power. All sectors of the economy, viz., industry, agriculture, commerce, trade and business, are vitally dependent upon power sector. The countries having abundant supply of power available to different sectors of their economy have realised substantially higher rates of industrial growth and a corresponding increase in the gross national product.

Power development in India commenced at the end of the 19th century with the provision of electricity supply in Darjeeling during 1897 followed by commissioning of a hydro power station at Sivasamudram in Karnataka during 1902. The first steam power plant in country was set up in 1899 at Calcutta to meet the power requirement of the metropolis. For the first time the water-power was utilized in India to run Cotton Mills at Gokak in 1886. A number of small power stations were setup by private industries, local bodies and government departments. The control of government over power supply had been an integral part of the Indian Telegraph Act till the Indian Electricity Act was passed in 1910. The Act prescribed the methods, procedures and conditions for the grant of licences to private electricity undertakings.

It, however, was intended to mainly regulate and prescribe rules for licencee undertakings rather than to co-ordinate the power development in the country. A separate legislation towards this end was enacted in the form of the Electricity (supply) Act. Under this Act, State Electricity Boards were constituted and recognised as the principal agencies for undertaking the overall responsibilities of generation, transmission and distribution of electricity within each State. In consonance with the provision of the Act, the Central Electricity Authority was established in 1950 for developing a national policy for power development and co-ordination among various agencies involved in the planning and implementation of power supply.

Five Regional Electricity Boards were setup during 1964-65 with the main object of establishing inter-State power system on a regional basis. Keeping in view the over-riding priority and importance of power, the Government of India has created a separate Ministry of Power. The primary responsibility of the Ministry of Power pertains to the development and augmentation of electrical energy. The Ministry is concerned with policy formulation, perspective planning processing of projects for investment decisions, monitoring of projects, training and manpower development and the administration and enactment of legislation in regard to power generation, transmission and distribution. The Central Electricity Authority constituted under the Electricity (Supply) Act, 1948 advises the Ministry on all technical, financial and economic matters. The Government of India, in 1992, had formulated a package of incentives to attract private participation in the power sector.

The Electricity Regulatory Commissions Act was passed in April 1998 with a view to pave the way for the establishment of the Central Electricity Regulatory Commission and the State Electricity Regulatory Commission. The objective of Central Electricity Regulatory Commission was to regulate the tariff of generation companies owned or controlled by the Central Government and inter-State transmission tariff of the transmission entities. The Electricity Bill 2001 has been introduced in Parliament in August, 2001. The Bill seeks to replace the three existing Acts, viz., the Indian Electricity Act, 1910, the Electricity (Supply) Act, 1948 and the Electricity Regulatory Commissions Act, 1998. The Bill provides a comprehensive yet flexible legislative framework for power development.

In India, the actual upliftment in the power sector started from the year 1951 with the inception of the First Five Year Plan. During the First Five Year Plan, power generation was accorded high priority. The investment in power sector was Rs. 260 crores in First Five Year Plan and it reached to Rs. 79,589 crores in the Eighth Plan. Showing a significant of investment of more than 305.11 times. Power sector in India has never achieved the targets of generation capacity set during the plan period. During the First Five Year Plan the shortfall was 200 MW i.e., 15.4 percent of the target. By the end of Eighth Plan, the shortfall widened to about 46.2 per cent of target. The causes of these huge slippage were attributable to delays in the supply of equipment, non-availability of raw materials like steal, coal, cement etc. to the required extent and delays in the receipt of replacement parts. But it is worth noting that the country is suffering from

acute power shortages as there have been continual shortfalls in the capacity addition since the inception of the planning. Quantum of electricity generation depends upon the capacity of generation. The generation of electricity is thus a function of generating capacity. The installed capacity of electric power generating stations recorded a massive increase of more than 58.78 per cent, i.e. from 1,700 MW in 1950-51 to 1,01,630 MW in 2000-01 consisting of 25,141.78 MW hydro, 73,628.30 MW thermal, 2,860 MW nuclear. Power generation in the country has increased from 5119 MUs during 1950-51 to 499450 MUs during 2000-01. The overall generation went up by more than 9656.7 per cent or 97.5 times more. The consumers of electricity can be grouped into six categories i.e., household, agriculture, industries, transport, commercial and others. The industrial sector is the major consumer of electricity. Its consumption accounted for nearly 34 per cent in 1998-99 of the total power generation followed by the agriculture 30 per cent and domestic sector accounted for nearly 18.4 per cent.

The gap in demand and supply in electricity has been widening rather than being bridged. The deficit in power went up from 16384 MUs in 1980-81 to 39816 MUs in 2000-01. This is partly due to the ever increasing demand for electricity and mainly due to the large and continuous slippage in the creation of installed generating capacity, poor capacity utilisation and increasing transmission and distribution losses. All India plant load factor of thermal plants was 55.3 per cent during the year 1991-92 and it reached 69 per cent in the year 2000-01.

Over the years, there has been considerable progress in respect of power generation, installed capacity, power consumption and the plant load

factor of thermal power. The rate of progress of hydropower has been quite slow leading to untapped power potential of large hydro power projects. Judging the past performance, one would safely conclude that the development and management of the power sector has been far from satisfactory. Therefore, there is a need to make indepth and critical examination of the construction, operation and monitoring wings of the power departments. With this end in view straight measures have been taken by the government in formulating the power plans and more importantly in executing them.

The Central Electricity Authority, constituted under the Electricity (Supply) Act, 1948, advises the Ministry of Power on technical and economic matters. The construction and operation of generation and transmission projects in the Central sector are entrusted to Central sector power Corporations, namely, the National Thermal Power Corporations, the National Hydro Electric Power Corporation, the North Eastern Electric Power Corporation and the Power Grid Corporation of India Limited. The Power Grid is responsible for all the existing and future transmission projects in the Central Sector. All these Corporation are under the administrative control of the Ministry of Power. Programmes of rural electrification are provided financial assistance by the Rural Electrification Corporation under the Ministry of Power. The Power Finance Corporation provides term-finance to projects in the power sector. It is a milestone in the development of Indian Power Industry.

The power generation in the country till late seventies had been predominantly through the State Electricity Boards which were created

under the Electricity (Supply) Act, 1948. However, to meet the growing demand for power and to enable the optimum utilisation of energy resources, the Government of India decided to take up a programme of establishing large thermal power stations in the Central sector in the country with a view to supplementing the efforts of the State sector in accelerating thermal power development. In view of the massive capital outlays, sophisticated technology and high degree of technical and managerial expertise involved in the construction, operation and maintenance of these large size thermal generating stations, the Government of India decided to set up National Thermal Power Corporation Limited (NTPC), a separate organisation in the Central Sector.

The NTPC came into existence in November, 1975, as a Central Government Undertaking, with the objective of planning, promoting and organising the integrated development of thermal power generation and execution of thermal power projects. The approved capacity of NTPC's projects is 24,455 MW and the commissioned capacity is 19,435 MW as on 31.12.2001. At present, NTPC has to its credit thirteen coal-based thermal power projects and seven gas/liquid fuel-based combined cycle projects. The main fuel of NTPC are coal, gas and naphtha. The Corporation is the biggest consumer of coal in the country for power generation. The expenditure on fuel was Rs. 976.02 crores in 1990-91 and it reached the figure of Rs. 9,934.21 crores in 2000-01. During the year 2000-01, total number of employees in NTPC was 23,978 which comprised 7,945 executives, 2,779 supervisors and 13,254 workmen. NTPC provides equal opportunity and work environment to the women employees. During the year 2001-02

women constituted 1.86 per cent in executive cadre, 3.19 per cent in the supervisor cadre and 3.63 per cent in the workmen cadre.

National Thermal Power Corporation works under the aegis of the Ministry of Power of Government of India. The Ministry of Power is kept informed and participates in the decision-making process within the company through its Joint Secretary who is nominated to the Board of the Company. Organizational Structure of NTPC functioning comprises of three-tiers, viz., the Corporate Centre, which is an apex body, secondly, the regional headquarters, thirdly, the plant. The Corporate Centre retains only broad policy making, strategic and long term planning functions, assumes responsibility for research and development, performs core engineering activities, maintains liaison with international bodies, monitors NTPC's overall performance as well as development of NTPC's human resource and management systems.

The second tier consists of five regional set-ups, namely North, West, East, South and National Capital Region with their headquarters at Allahabad, Nagpur, Patna, Hyderabad and Delhi respectively. Each region is headed by an Executive Director who is accountable for the operations and project execution activities in the respective regions. At the regional headquarters offices, the Executive Director is the Kingpin and plays the middleman's role between the higher authority and the project's management. The regional offices are responsible for the construction, commissioning and operation of generating units. The project teams working at sites are headed by General Managers who report to their

respective Executive Directors in the region. The Executive Directors, in turn, report directly to the Chief Executive at the Corporate Centre of their activities. Lastly, the projects of NTPC are the operational units directly responsible for generation of power.

Personnel and Administration Department has been renamed as Human Resource Department and the designation of the functional Director has also been changed from Director (Personnel) to Director (Human Resources). The functions of Human Resource Department are all personnel matters and include Promotion, Project Employee Benefits, Human Resource Policy, Recruitment, Compensation, Employee Welfare, Pension, and Employees grievance redressal.

Of all the organisations dealing in the generation of power in the country, NTPC is a key player in the power sector. NTPC is making significant contribution for the growth of the economy by producing one-fourth of India's total power generation. The main working of NTPC include production of electricity, provision of consultancy services in engineering and construction of power stations, contracting and procurement services, operation and maintenance of thermal power stations, renovation and modernisation of power plants and financial and management consultancy, etc. It is observed that all these operational areas of the NTPC have been steadily improving and the Corporation has established new records of performance in each area of its activity.

On the basis of its performance and success, NTPC has been ranked sixth in thermal generation amongst the world's thermal generating

companies and the second in term of capacity as per the bench-mark data of 200 top utilities of the world published by Marketline International, U.K. The power generation of NTPC was 46879 MUs in 1990-91 and it increased to a record figure of 130154 MUs in 2000-01, representing an overall increase of nearly 177.6 per cent or more than two times during the years under review. NTPC sells its entire power to the State Electricity Boards or State Utilities.

The plant load factor is another important parameter to measure the capacity utilisation. The plant load factor of NTPC in 1990-91 was 61.7 per cent which went up to 81.8 per cent by 2000-01. All the thermal units of NTPC maintained an impressive track record of plant load factor over the years.

The consultancy group of NTPC targets both domestic as well as international customers. Earning from consultancy services rendered by the NTPC rose from Rs. 20.09 crores in 1990-91 to Rs. 935.96 crores in 2000-01, showing an overall increase of nearly 4558.83 per cent or 46.5 times more. The consultancy wing has secured several prestigious International turnkey contract and consultancy assignments. These include two turnkey contracts of Dubai Electricity and Water Authority and the other at Awir and Hatta. The other noteworthy prestigious assignments bagged by NTPC from international agencies are EPDCI, Japan; National Development Corporation, Tanzania; Westmont, Malaysia; Hydro Electric Commission, Tasmania; World Bank, and Asian Development Bank etc.

NTPC is now considered among the first few Public Sector Undertakings which entered into a Memorandum of Understanding with the Government of India. Performance-wise, the Company surpassed all its MoU targets with the Government of India for the year 2000-01 and achieved 'Excellent Rating' for the 14th consecutive year.

There is no denying the fact that finance is the life blood of industry and business. Proper utilization of funds is essential in any organisation because it is on the judicious utilization of the financial resources that overall performance of an enterprise will depend. The analysis of financial performance of NTPC has revealed that the Corporation stands on very sound footing. The working capital of NTPC has registered steadily increasing trend over the years. From Rs. 1,364.11 in 1990-91 the rise in working funds 2000-01 amounted to Rs. 9,343.13 crores, reflecting an increase of about 829.17 per cent over 1991. In India, the study reveals that NTPC ranks second in terms of profit and seventh in terms of sales. The amount of net profit was recorded at Rs. 700.95 crores in 1990-91 which jumped to Rs. 3,733.80 crores in 2000-01 registering a tremendous rise of about 432.68 per cent or 5.32 times more. From the analysis of growth of reserve and surplus it has been observed that the Corporation has maintained constant accumulations in its reserve and surplus over the years. During the year 1990-91 the amount of reserve and surplus which was Rs. 2,441.98 crores soared to a record figure of Rs. 18,008.24 crores in 2000-01. The ratio analysis of Corporation's financial statements reveal that the quick ratio had been higher than the norm of 1 : 1 or hundred per cent throughout the period. The current ratio, too, measure upto the standard parameter by

any norms. It has been feasible on account of judicious use of current assets and current liabilities, proving the point that the Corporation is financially solvent enough and has the sufficient degree of safety. The net worth of the NTPC during the period under study has been consistently increasing. In the 1990-91 the net worth of the Corporation was Rs. 8,797.09 crores which increased to Rs. 25,820.79 crores in 2000-01, yielding an overall rise of nearly 193.5 per cent.

The study concludes that from 1990-91 to 2000-01, the performance of the NTPC has been quite satisfactory. Today it ranks as the second largest profit making public sector enterprise in the country. Foremost in the Indian power sector today, the NTPC envisions of being in future one of the largest and best power utilities in the world and thereby, contributing to India's emergence as one of the world's leading economies. Towards the realisation of this dynamic vision, NTPC adheres to rely on its core values. These values will continue to guide and inspire the NTPC and lead it to achieve higher levels of excellence in the new millennium as well.

At present, in the administration hierarchy of the NTPC, the Board is the highest body to look after the technical, projects, financial, operational and commercial, task of the National Thermal Power Corporation. The organizational structure of NTPC is headed by a Chairman and Managing Director. The Board comprises a Chairman and Managing Director and six whole time Directors in different functional areas besides two part time officials and four non-official Directors.

Generally, the Public Undertakings run on commercial lines and are directed as regards their working by the Board of Directors. But in the

NTPC, the Minister is the supreme authority and takes all important decisions. The Board only interprets these decisions and implements them. Thus the Board acts on the lines prescribed by the Ministry of Power of the Govt. of India. The present NTPC Board has a similar status and comes only next in the administration. It is the Minister who formulates all policies and decides all matters. The technical policies which are formulated by the Board are in fact subpolicies which aim at facilitating the execution of the main policies formulated by the Minister. Thus the NTPC Board does not function as a policy-making Board but plays a second fiddle under the Minister of Power.

The principles of selection to the Board are not well-defined and seem to be defective. Too much weightage is given to seniority. Although seniority may be a sound criterian but to ignore merit may not serve a fruitful purpose. Herbert Morrison's view that the Board should be composed of the best brains that we can get is quite relevant to the composition of the NTPC Board. The policy of the constitution of Board need to be reformulated if the Board wants to assert its functional autonomy.

It is suggested that the Board should be reorganised. The Board Members should be given an opportunity to exchange their ideas with people having a lot of business experience. It will certainly prove beneficial to the organisation. An outsider can be nominated to the Board with business experience without regard to seniority. The Board may thus obtain the services of those who are experts in business in running public sector undertakings as well as academicians from ITI's and Universities whose experience and counselling would prove valuable to it.

The present practice of nominating members to the Board who are on the verge of retirement is not sound. The Minister can hardly expect to get the right type of suggestions from persons who have reached their retirement age. Thus the appointment to the Board should not be made solely on consideration of seniority. Members on the Board should be re-appointed for a fixed tenure. A fixed term ensures a smooth flow of fresh mind and expertise on the Board and creates a sense of responsibility and dynamism in the Members.

The Personnel Department of the NTPC, which has authority in matters of policy-making for recruitment, should raise the standard of qualifications of staff recruited for project sites. Recruitment policy should make it compulsory for every employee of this class to have a technical Diploma or vocational course training as the minimum condition for eligibility of service. This in turn would save a lot of time in training.

There is also an urgent need to reconstruct and redesign the training programme of the NTPC and to update the existing training programmes with new technological changes. This is the primary responsibility of the Personnel Department so that the working of the NTPC operation may easily turn towards optimum efficiency.

A great drawback of training institutions run by NTPC is that sometimes the officers are appointed as teachers or lecturers in the training institutions without any attempt at finding out the suitability of such officers for the teaching profession. An officer may or may not have the capacity to teach. Teaching is an art which requires a lot of experience specially in the

teaching field. Hence, there should be a positive selection process for the appointment of a teacher or lecturer for training purposes.

The promotion programmes also have some defects. The present promotion scheme for placing the junior administrative grade staff in the senior scale gives much weightage to the confidential report. Sometimes it happens that the officers who prepare this report, do not like an employee for personal reasons although he is competent, hard working and has the ability to face the situation with confidence. But the confidential reports does not favour him. This leads to frustration in his career and affects the overall morale of the workforce. The confidential report should not be the only determining factor of promotion, rather the authority should follow a procedure where merit should be the determining factor of promotion.

Except in a few cases promotion in the NTPC is based on seniority. Although seniority may be a reasonable criterion, it alone should not be relied upon. Merit too has its claims. Both seniority and merit should form the basis of the promotion policy. Here it is suggested that both the criteria should be kept in mind while making promotions. When there are two employees of equal seniority, merit should be the deciding factor in a promotion policy. Where there are two employees of almost equal competency, seniority should be the decisive factor. Such a policy would satisfy the management which prefers ability or merit and the Trade Union which prefers seniority. It will also give satisfaction to the employees.

The employees should be motivated through the appreciation of work, introduction of workers participating scheme, etc. so that they feel as partner in the organisation and not the worker themselves.

Congenial environment, cordial and healthy relationship between the management and the employees in an undertaking play an important role in increasing its productivity and efficiency. This is possible when the management and the workforce interact in a spirit of mutual trust and confidence and without causing friction. No organisation can run efficiently or effectively if there is turmoil in industrial relations. It is, therefore, necessary that management should always adopt a welfare attitude towards its employees and the workers should also possess positive attitude and identify with the objectives of the organisation.

Improvement in the management would bring better performance and results and will go a long way in supplementing the efforts to bring about an overall improvement in the operative parameters like, generation and plant load factor and other services.

There are certain areas related to workers safety and welfare which need focus in the NTPC. Kayamkulam combined cycle power station uses naphtha as a primary fuel. Naphtha is a very dangerous fuel because of its high explosive properties. It is highly vulnerable to catch fire even at room temperatures. Prolonged exposure to naphtha leads to nausea, dizziness, skin irritation etc. Hence, the use of naphtha is very risky for the employees. In this regard NTPC should take necessary safety measures so as to avoid this situation and should develop alternatives.

Moreover, checklists should be prepared for ensuring that nothing related to naphtha is left unchecked. Further these checks should be applied on daily, weekly and monthly basis. If any defects are found in these

checklists they should be immediately brought to the notice of the maintenance team for rectification. Wherever possible, non sparking tools for maintenance should be used for ensuring that naphtha does not catch fire. Even when ordinary tools are used, they should be dipped in water before use to make them free of sand etc. so as to avoid sparking.

It is important to suggest that power plant safety committee members should keep a regular watch on the naphtha handling areas and corrective measures, when necessary, should be taken as soon as possible. Separate fencing should be provided around licensed area and vehicle movement should be restricted in licensed area only. Smoking which requires use of matchboxes and lighters, should be prohibited inside the premises. It is also observed that the working of NTPC will be adversely affected if the payment of Railways outstandings is not cleared by the Corporation. It is suggested that prompt payment should be made by NTPC authority to the Indian Railways.

Mechanical, Electrical, Civil and auxiliary equipments are procured by NTPC from outside through different standard companies. In this process the NTPC suffers from delays resulting in loss of time, money and sometime opportunity. It is suggested here that the NTPC should go in for diversification of their business insofar as to produce equipment and other necessary input required by it. This will further enhane the efficiency of this enterprise.

Outstanding dues of NTPC against Electricity Boards aggregated to Rs. 19,128.63 crores during 2000-01 and the amount is increasing everyday.

NTPC should take adequate steps for recovery of its dues. This amount can be recycled for further growth, diversification, expansion and effective operations of the enterprise.

Auxiliary plants need power supply for their initial operation in order to be able to generate power later. There is thus an immediate need to ensure uninterrupted supply of electricity to auxiliary plants which, in turn, improve the productivity and working of this important public sector undertaking, the NTPC.

Implementation of development projects takes too much time and therefore it is required that the effort should be made on continuous basis to reduce the gestation period in project implementation. It will ensure the quality of work and economy in expenditure.

Attention need to be focused on the operation and maintenance of power plants to improve their working. The need of the hour is that the concerned authority should take all necessary steps to ensure the maintenance of the power plant and updation of all sorts of equipment so that proper supply of electricity could be possible and interruptions in the supply of power get avoided.

Some power stations which are acquired by the NTPC are using old machine and equipments. Generally old equipment and machinery reduce the efficiency. Here it is observed that the NTPC should take necessary steps in regard to introducing new machinery and equipment. This would improve the working efficiency and productivity of the power stations.

A number of inputs are being supplied to NTPC, like oil, coal and equipment, etc. These input suppliers have a kind of commercial pressures on NTPC to realise their dues from time to time in that they demand that they should be given power supply free of cost by the NTPC. Such a tendency should be totally stopped. In this regard it is suggested that the NTPC should go in for creating or generating its own resources to meet its input requirements. Only then such pressure could be avoided.

In thermal power stations, sufficient water is required for cooling purposes. Sometimes in summer, water in required quantity is not available which hampers the working of the NTPC. Recently few steps have been taken in this regard by the NTPC and the Corporation has introduced new system for cooling which requires small amount of water. Here it is observed that the NTPC should make such system of cooling compulsory for every thermal power station so that their working is not adversely affected due to lack of water.

Finally, the study concludes with the observation that NTPC is a prestigious umbrella organisation in the power sector of the nation. It has not only augmented the power generation capacity in the country but has also chiefly contributed to the expansion of national power sector by establishing new power stations. It has also rendered valuable technical help to organisations engaged in the power generation, transmission and distribution in the country. The organisation, thus, plays a pivotal role in India's economic development. The Corporation needs further strengthening to exploit its potential to the fullest extent and if the measures suggested

above are introduced, there is every reason that the NTPC's working capacity will undergo a tremendous improvement and enlargement. The Corporation would then be able to successfully meet the present challenges of shortage of power and immensely contribute to the economic advancement of the country.

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Appendices

APPENDIX - I

PLANT LOAD FACTOR OF STATE ELECTRICITY BOARDS DURING THE YEAR 2000-01

State Electricity Board/Utilities	Plant Load Factor
Andhra Pradesh	85.1
Assam	18.5
Bihar	15.4
Chhattisgarh	65.7
Delhi	49.5
Gujrat	66.9
Haryana	49.7
Karnataka	81.3
Madhya Pradesh	66.6
Maharashtra	72.6
Orissa	81.7
Punjab	77.9
Rajasthan	85.0
Tamil Nadu	74.8
Uttar Pradesh	57.0
West Bengal	36.0

Source : Energy Management, Power line, New Delhi, 2002.

APPENDIX - II

NUMBER OF VILLAGES ELECTRIFIED IN INDIA AS PER 1991 CENSUS (AS ON 31.3.2000)

State/ Union Territory	Villages (1991 Census)		
	Total	Electrified	Percentage
State :			
Andhra Pradesh	26586	26565	100.0*
Arunachal Pradesh	3649	2171	59.5
Assam	24685	19019	77.0
Bihar	67513	47888	70.9 ($$)
Goa	360	360	100.0@
Gujrat	18028	17940	100.0*
Haryana	6759	6759	100.0
H.P.	16997	16844	99.1
J&K	6477	6315	97.5($)
Karnataka	27066	26691	98.6(+)
Kerala	1389	1384	100.0
M.P.	71526	68346	95.6
Maharashtra	40412	40412	100.0@
Manipur	2182	2001	91.7
Meghalaya	5484	2510	45.8
Mizoram	698	691	99.0
Nagaland	1216	1196	98.4
Orissa	46989	35190	74.9
Punjab	12428	12428	100.0
Rjasthan	37889	35447	93.6
Sikkim	447	405	100(#)
T.N.	15822	15822	100.0
Tripura	855	810	94.7
U.P.	112803	89117	79.0
W. B.	37910	29515	77.9

Contd...

Union Territory :			
A & N. Islands	504	501	100.0
Chandigarh	25	25	100.0
D&N Haveli	71	71	100.0
Daman & Diu	24	24	100.0
Delhi	199	199	100.0
Lakshadweep	7	7	100.0
Pondicherry	263	263	100.0
All India	587258	506916	86.3

Source : Govt. of India, Ministry of Statistics & Programme Implementation, "Statistical Abstract, India, 2001", New Delhi, p. 115.

(*) Fully electrified. Balance not feasible for electrification.

(@) Provisional to be confirmed as per 1991 consus

(+) 329 villages declred non-feasible for electrification.

($$) Achievement as per 1981 census

($) Achievement as per 1971 census. 1991 census not held.

(#) Provisional 42 Nos. forest villages not electrified.

APPENDIX III

POWER TRADING BY POWER TRADING CORPORATION (PTC)

Seller	Buyer	Quantum (MW)	Type of Transaction
Uttaranchal	Haryana	50	Round the clock
	Delhi	50	Round the clock
	Maharashtra	50	Time of day
	Pondicherry	50	Time of day
	Punjab	100	Time of day
Delhi	Haryana	300	Off-peak
	Madhya Pradesh	300	Off-peak
	Maharashtra	150	Time of day
Goa	Madhya Pradesh	35	Time of day
	Karnataka	50	Time of day
	Gujarat	50	Round the clock
	Punjab	25	Off-peak
	Chandigarh	25	Time of day
	Maharashtra	50	Round the clock
West Bengal	Delhi	100	Round the clock
	Delhi	40	Time of day
	Haryana	40	Time of day
	Haryana	60	Round the clock
	Madhya Pradesh	400	Time of day
Punjab	Rajasthan	50	Round the clock
	Madhya Pradesh	50	Round the clock
Andhra Pradesh	Karnataka	100	Round the clock
Chhattisgarh	Delhi	200	Peak
	Karnataka	100	Time of day
Damodar valley	Rajasthan	50	Round the clock
Corporation	Haryana	50	Round the clock
	Madhya Pradesh	100	Time of day
Malava (IPP)	Delhi	70	Round the clock
	Haryana	70	Round the clock
Western Region States	Southern region States	Infirm	As and when available

Source · Powerline Magazine, March 2003, New Delhi.

APPENDIX - IV

PARTICULARS OF EMPLOYEES PURSUANT TO SECTION 217(2A) OF THE COMPANIES ACT

Name	Designation and Nature of duties	Remuneration	Qualification	Exp. (Yrs.)
(1)	(2)	(3)	(4)	(5)
Employed for the Whole Year				
Farhat Q.A.	CDE, CC	1425735	B. Tech.	22
Gujral A.S.	Sr. MGR, CC	1309168	B.E.(Elect.)	19
Chandan Roy	ED. (Engg.)	1440404	B.E. (Mech.)	24
R.K. Saigal	DGM, CC	1413638	B.E. (Mech.)	20
Sudhanshu S.	MGR. (Comml.)	1400395	B. Sc. (Mech.)	16
Employed for the part of year				
Bahl S.K.	AGM, CC	652440	B.Sc. (Engg.)	17
Bopanna P.M.	AGM, CC	429353	M.E. (Civil)	22
DUA R.N.	Manager, BTPS	916287	B.Com, FCA	21
Gupta R.C.	Dy. MGR. STPS	1021287	B.A., SAS	25
Kaushal Y.N.	Sr. MGR., CC	1150663	M.Sc., PGDM	15
Mishra Pravin	Sr. MGR., CC	364879	Diploma (M)	23
Mukherjee A.N.	DGM, BTPS	1106628	M.Com AICWA	21
Ramaswamy A.P.	ED, SR	1113093	B.E. (Mech.)	38
Saha B.B.	GM, CC	498196	B.E. (Civil)	23
Saluja S.L.	Dy. MGR., BTPS	2354670	Dip.(Elect, Engg.)	23
Sanyal S.K.	GM, CC	691989	B.E.(Electro.)	23
Sarkar G.S.	ED, CC	495298	B.E. (Elect.)	23
Sharma, J.C.	Sr. Mgr., BTPS.	808598	Dip. (Mech. Engg.)	20
Sharma R.K.	A.E., BTPS	1201596	Dip. (Mech. Engg.)	25
Shrivastva M.K.	MGR, NCRHQ	1509119	Dip. (Mech. Engg.)	23
Singh Rajendra	CMD	741697	Grad. in Engg., MBA, Fellow IEEE, U.S.A.	36

Source : Govt. of India, NTPC, Annual Report, 2000-01, New Delhi.